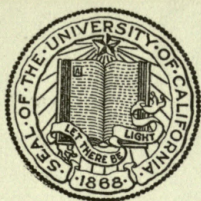


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GUIDE TO THE STUDY OF ANATOMY,

BASED UPON NOTES OF THE LECTURES OF
PROF. WILLIAM DARLING,
TO WHOM THIS WORK IS DEDICATED WITH THE FEELINGS OF MOST
PROFOUND RESPECT AND GRATITUDE

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SECOND EDITION.

— NEW YORK, FEBRUARY, 1880. —

JAMES BATCHELAR, PRINTER,
No. 49 ANN STREET,
NEW YORK.

Entered according to Act of Congress, by VAN SANTVOORD & HAUFF, in the Office of the Librarian
of Congress, at Washington, D. C.

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PREFACE.

The Author does not desire to supplant the many excellent text-books upon Anatomy already published, with this volume, but he offers this book as its title implies—as “*a Guide*” to facilitate the study of Anatomy.

The book, it is expected will be best appreciated in the lecture room.—The alternate blank pages having been left for any notes the student may desire to make.

It is the aim and hope of the author that this book will supply a want of the medical student.

347 Second Ave., New York City,
February, 1880.

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The word **Anatomy** properly signifies DISSECTION, but it has been appropriated to the study of the parts of organized bodies.

Anatomy is divided into :

Phytotomy or vegetable Anatomy, or Anatomy of the
plants, and

Zootomy or animal Anatomy.

Zootomy is again divided into:

Comparative Anatomy and Special Anatomy.

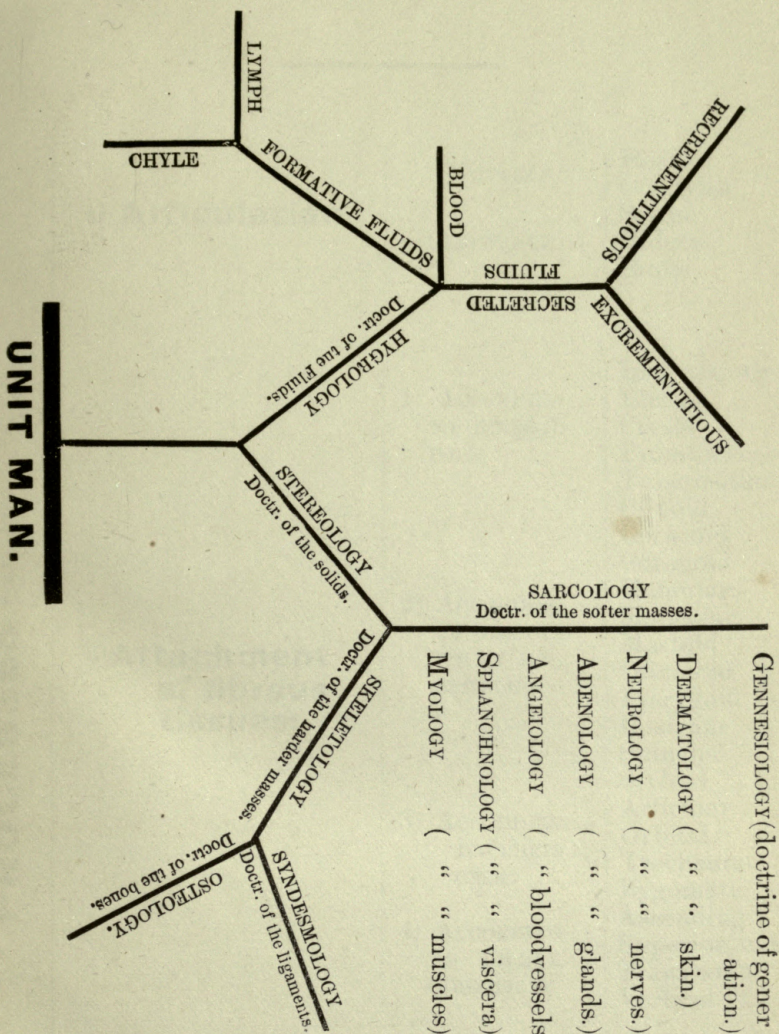
Special Anatomy is divided into :

Histology or general Anatomy.

Morphology or descriptive Anatomy.

Relative or Surgical Anatomy.

ANATOMY { Phytotomy
 { Zootomy { Comparative
 { Special { Histology
 { Morphology
 { Relative or Surgical An.



CLASSIFICATION OF PROCESSES.

serve for :

a) Articulation

- | | | |
|---|-------------|----------|
| { | MOVABLE : | Head |
| | | Condyles |
| | | Serrae |
| | IMMOVABLE : | Ridges |
| | | Roots |

b) Attachment of fibrous tissues:

- | | | |
|---|---|----------------|
| { | 1) ACCORDING TO GENERAL FORM : | Impressions |
| | | Lines |
| | | Crests |
| | | Prominences |
| | | Tuberosities |
| | | Clinoid |
| | | Coracoid |
| | | Coranoid |
| | 2) ACCORDING TO OBJECTS THEY RESEMBLE : | Hamular |
| | | Malleolar |
| | | Mastoid |
| | | Odontoid |
| | | Pterygoid |
| | | Rostrum |
| | | Spinous |
| | | Styloid |
| | 3) ACCORDING TO THEIR USES : | Articular |
| | | Orbital |
| | | Trochanter |
| | | Zygomatic |
| | 4) ACCORDING TO THEIR DIRECTION : | Ascending |
| | | Superior, etc. |
| | | Transverse |
| | | Vertical |

c) **Reflection:** when they cause tendons to deviate from their original course, as in the case of the Hamular process of the Sphenoid, and in the external and internal Malleoli.

CLASSIFICATION OF CAVITIES OF BONES.

Cavities of bones:	{	ARTICULAR :	{	Cotyloid Glenoid Trochlea Facet Alveolar	
			{	1) Reception :	--Occipital groove
			{	2) Insertion :	{ Temporal fossa Pterygoid
			{		Fissures
			{	3) Transmission :	Canals
			{		Foramina
			{		Aquaeducts
			{	4) For the passage of tendons :	Grooves
			{		Channels
			{		Medullary
			{	5) For Nutrition :	Terminal
			{		Capillary

The Skeleton of an Animal may be either an

Exo-Skeleton or Derma-Skeleton (where the skeleton is wholly external, as in the Crustacea); or

Endo-Skeleton or Neuro-Skeleton (where the skeleton is internal, as in the Mammalia); or

Splanchno-Skeleton (where bones are found in some internal organs).

A SKELETON in general may be a **natural** (bones combined by their natural ligaments) or an **artificial** (bones combined by artificial means—as wire, etc.)

An artificial skeleton is better adapted for the study of Anatomy than a natural one.

Osteology.

The Human Skeleton consists of 200 bones,* and is divided into 4 segments :

Head,	22 bones,
Trunk,	53 “
Extremities,	124 “
Hyoid Arch,	1 “

200 bones.

* N. B.—The teeth, the ossicula of the ear, the wormian bones in the skull and the sesamoid bones are not included.

THE HEAD consists of 22 bones, and is divided into :

Cranium	8 bones.
Face	14 “

22 bones.

THE FACE consists of 14 bones, and is divided into :

Upper Jaw,	13 bones.
Lower	“ 1 “

THE TRUNK consists of 53 bones, and is divided into 3 segments :

1)	Vertebral Column	24 bones.
2)	Thorax	25 “
3)	Pelvis	4 “

53 bones.

The Extremities consist of 124 bones.

There are 4 Extremities :

2 Upper Extremities,
2 Lower “

Each Upper Extremity consists of
32 Bones, to which are attached
62 Muscles.

Each Lower Extremity consists of
30 Bones, to which are attached
60 Muscles.

Osteology

The Human Skeleton consists of 206 bones, and is divided into 2 main parts:

- 1. The Axial Skeleton (80 bones)
- 2. The Appendicular Skeleton (126 bones)

THE LOWER EXTREMITY consists of 26 bones, which are divided into:

- 1. Femur
- 2. Patella
- 3. Tibia
- 4. Fibula
- 5. Talus
- 6. Calcaneus
- 7. Navicular
- 8. Cuneiforms
- 9. Metatarsals
- 10. Phalanges

THE FACE consists of 14 bones, which are divided into:

- 1. Upper Jaw (Maxilla)
- 2. Lower Jaw (Mandible)

THE TRUNK consists of 26 bones, which are divided into:

- 1. Vertebral Column (26 bones)
- 2. Ribs (24 bones)
- 3. Sternum (3 bones)

THE UPPER EXTREMITY consists of 26 bones, which are divided into:

- 1. Humerus
- 2. Radius
- 3. Ulna
- 4. Carpals (8 bones)
- 5. Metacarpals (5 bones)
- 6. Phalanges (14 bones)

Each Upper Extremity consists of 26 bones, which are divided into:

- 1. Humerus
- 2. Radius
- 3. Ulna
- 4. Carpals (8 bones)
- 5. Metacarpals (5 bones)
- 6. Phalanges (14 bones)

THE UPPER EXTREMITY is divided into 4 divisions, viz:

Shoulder,	2	bones.
Arm,	1	“
Forearm	2	“
Hand,	27	“

32 bones—2 Upper Extr., 64 bones.

THE LOWER EXTREMITY is divided into 3 divisions:

Thigh,	1	bone.
Leg,	3	“
Foot,	26	“

30 bones—2 Lower Extr., 60 bones.

THE HYOID ARCH consists of one bone called: the Hyoid bone, or

OS HYOIDÆUS.—1 bone.

The bones are divided into **single and pair bones.**

There are in the human body:

34	single bones, and
83	pair bones.

The Single Bones are situated in the median line of the body (mesial bones); they are symmetrical (symmetrical bones) and the muscles attached to them are in pairs.

NAMES OF THE BONES.

HEAD:—Cranium (8 bones) consists of

4 Single Bones:	{	Occipital bone.
		Sphenoid “
		Ethmoid “
		Frontal “ and
2 Pair Bones:	{	2 Temporal bones.
		2 Parietal “

FACE: 14 bones.

Upper Jaw, 13 bones, consists of

1 single bone, Vomer, and

6 pair bones. { 2 Nasal bones.
2 Superior Maxillary bones,
2 Lachrymal bones,
2 Malar “
2 Palate “
2 Inferior turbinated bones.

Lower Jaw consists of

1 single bone, Inferior Maxillary bone.

TRUNK, 53 Bones,

53 { Vertebral column, 24 bones.
Thorax 25 bones, (the 12 dorsal vertebrae excluded.)
Pelvis, 4 bones.

The 25 bones of the **Thorax** are

1 Single bone,

Sternum, and

12 Pair bones,

the 12 ribs (pairs).

The 4 bones of the **Pelvis** are:

2 Single bones,

Sacrum,

Coccyx, and

1 Pair bone,

2 Ossa Innominata.

Upper Extremity, 32 bones.

Shoulder, 2 bones,

Scapula,

Clavicle,

Arm, 1 bone.

Humerus or Os Brachii.

Forearm 2 bones.

Ulna,

Radius.

Hand, 27 bones. These are divided into :

Carpus,	8 bones,	}
Metacarpus,	5 “	
5 Fingers or Digits,	14 “	
<hr/>		27

Lower Extremity, 30 Bones.

Thigh, 1 bone.

Femur.

Leg, 3 bones.

Patella,

Tibia,

Fibula.

Foot, 26 bones. These are divided into :

Tarsus,	7 bones,	}
Metatarsus,	5 “	
5 Toes or Digits,	14 “	
<hr/>		26

The bones in the fingers and toes are named **Phalanges**.

The Phalanges of the Thumb are sometimes called **Internodii**.

Hyoid Arch, 1 bone.

Hyoid bone or Os Hyoide~~us~~s.

The bones of the human body are otherwise divided into:—

Long, Short, Flat and Mixed or Irregular Bones.

	HEAD.		TRUNK.			EXTREMITIES.		HYOID ARCH.	SUMMA.
	Cranium.	Face.	Vert. Col.	Thorax.	Pelvis.	Upper.	Lower.		
Bones.									
Long	—	—	—	—	—	46	44	—	90
Short	—	—	—	—	—	16	14	—	30
Flat	4	5	—	25	2	2	2	—	40
Mixed	4	9	24	—	2	—	—	1	40
	8	14	24	25	4	64	60	1	200
	22		53			124			Total.

The **Long Bones** are situated in the **extremities**. The **Short Bones** are also situated in the **extremities** (in the Carpus and Tarsus). The **Flat Bones** are found in the walls of the cavities, and most of the **Mixed Bones** are situated in the Median line of the body.

[There are 3 great cavities in the body :

The Cranial cavity in the Head.

The Thoracic “ “ Thorax.

The Abdominal “ “ Abdomen.]

Bones entering the different joints.

The Shoulder-joint is formed by **2 bones**.

Scapula, and

Humerus.

The Elbow-joint is formed by **3 bones**.

Humerus,

Ulna, and

Radius.

The Wrist-joint is formed by **4 bones**.

Radius,

Scaphoid,

Semilunar,

Cuneiform.

The Hip-joint is formed by **2 bones**.

Os Innominatum, and

Femur.

The Knee-joint is formed by **3 bones**.

Femur,

Patella, and

Tibia,

The Ankle-joint is formed by **3 bones**.

Tibia,

Fibula, and

Astragalus.

HEAD.

OCCIPITAL BONE forms the posterior and inferior part of the Cranium, it articulates with **6 bones**,

2 single bones { Sphenoid, and
Atlas.

and 2 pair bones { 2 Temporal, and
2 Parietal.

The Occipital bone presents for examination:

2 surfaces[exterior and interior].

4 borders [2 superior and 2 inferior].

4 angles [1 superior, 2 lateral, 1 inferior].

The exterior surface is convex, and presents, seen from the superior angle towards the inferior:

A smooth surface for the Occipito-Frontalis muscle, with

The External Occipital Protuberance for the attachment of the Ligamentum Nuchae;

A Superior Curved line going sideways on either side from the external protuberance;

An Occipital Crest going downwards to the Foramen Magnum.

An Inferior Curved line going sideways from the middle of the crest;

The Foramen Magnum through which passes:

The Medulla Oblongata and its membranes,

The Spinal Accessory Nerves or the 11th pair of the cranial nerves,

The two Vertebral Arteries.

The 2 Occipital Condyles which articulate with the Atlas.

They are convex, and directed downwards and outwards. On the inner side of each condyle is a tubercle for the check-ligaments, which connect them with the **Odontoid Process** of the Axis or 2nd Cervical Vertebra.

HEAD.

OCIPITAL BONE

The Occipital bone

The external surface

Posterior Condylloid Foramen, often wanting, which, when present is situated posterior to the condyle and transmits a little vein.

Anterior Condylloid Foramen, always present, and situated anterior to the condyle, which transmits the 12th cranial nerve, or the **Hypoglossal Nerve**.

Basilar Process in front of the Foramen Magnum, which articulates with the Sphenoid. This articulation usually undergoes ossification in adults.

The Interior surface of the Occipital Bone is concave. The space posterior to the Foramen Magnum is divided by a **Crucial ridge into 4 fossae**. The 2 superior fossae lodge the posterior lobes of the Cerebrum, the 2 inferior the hemispheres of the Cerebellum. At the centre of the crucial ridge is an eminence—the **Internal Occipital Protuberance**—which corresponds to the outer or external Protuberance. In the 4 arms of the Crucial ridge are **grooves** for the lodgment of **Sinuses**.*

* N. B.—By “**Sinus**” we understand, when speaking of the **Cranium**: membranous canals formed by the **Dura Mater** for the passage of venous blood. When speaking of **Cranial bones** we understand by “**Sinus**” cavities in the bones, for example: Sphenoidal Sinuses, Frontal Sinuses, etc.

There are **15 Sinuses** in the Cranium:

5 Single Sinuses.	{	Superior Longitudinal Sinus,
		Inferior “
		Straight Sinus,
		Circular “
		Transverse “
and 5 Pair Sinuses.	{	2 Lateral Sinuses,
		2 Occipital “
		2 Superior Petrosal Sinuses,
		2 Inferior “
		2 Cavernous Sinuses.

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6 of the Sinuses come together at the **Torcular Herophili**, which is situated a little beside the Internal Occipital Protuberance. These are :

- | | | |
|-----|--|-------------------------|
| 6 { | 2 Occipital Sinuses, | } bringing the blood to |
| | The Superior Longitudinal Sinus | |
| | The Straight Sinus, and | |
| | 2 Lateral Sinuses, which carry the blood away from the Torcular Herophili. | |

The **interior surface** of the **Basilar process** presents a shallow concavity on which rests the Medulla Oblongata.

The Borders of the Occipital bone are :

The 2 Superior borders articulating with the Parietal bones, and

The 2 inferior borders with the Temporal bones.

In the lower portion of the inferior border we see **the Lateral process** and **the Jugular Foramen**.

The Occipital bone gives attachment to **12 pairs of Muscles**, viz :

- | | | |
|-----|-------------------------------------|--|
| 3 { | Occipito-Frontalis, | } to the superior curved line. |
| | Trapezius, | |
| | Sterno-Cleido-Mastoid | |
| 2 { | Complexus, | } to the space between the curved lines. |
| | Splenius Capitis, | |
| 3 { | Obliquus Superior, | } to the inferior curved line and the space between it and the Foramen Magnum. |
| | Rectus Capitis Posticus Major, | |
| | “ “ “ Minor, | |
| 1 { | Rectus Capitis Lateralis, | } to the Jugular process. |
| | “ “ Anticus Major, | |
| 3 { | “ “ “ Minor, | } to the Basilar process. |
| | Superior Constrictor of the Pharynx | |

The Occipital bone has **4 centres of development**:

1 for the posterior part,

1 for the **Basilar process**,

2 for the **2 Condyles**.



SPHENOID BONE.

The word "sphenoid" means wedge-like, indicating, that the bone is wedged in among the other bones. The Sphenoid bone consists of:

a body,

3 pairs of greater processes,

4 " " smaller " , and

3 single processes.

The greater processes are:

2 Greater wings } projecting laterally.
2 Lesser " " }

2 Pterygoid processes projecting downwards.

The smaller processes are:

1) such as connect with the body of the Sphenoid bone :

3 single and 2 pairs :

3 single. { Ethmoidal Spine,
 Olivary process,
 Rostrum.

2 pairs. { Posterior Clinoid process,
 Middle " often wanting.

2) such as connect with the Lesser wings :

1 pair : Anterior Clinoid process.

3) such as connect with the Greater wings :

1 pair : the Spinous process.

The Sphenoid bone resembles in shape : a **bat** (or better a butterfly). It forms the anterior and middle portion of the base of the skull.

It articulates with 12 bones:

all the bones of the Cranium, except itself and 5 bones of the Face, viz : 2 Malar, 2 Palate and the Vomer, or **4 single bones** and **4 pair bones**, viz :

Occipital,	} and {	2 Parietal,
Ethmoid,		2 Temporal,
Frontal,		2 Malar,
Vomer,		2 Palate,

The Sphenoid bone presents 5, sometimes 6 pairs of openings, and one canal : the Vidian Canal.

The Body of the Sphenoid bone resembles a hollow square box; it presents for examination: **6 surfaces**:

an **anterior**, a **posterior**, a **superior** and an **inferior**, and **2 lateral surfaces**.

The Anterior surface presents in the median line a **vertical Lamella**, which articulates with the **perpendicular plate of the Ethmoid** forming a part of the Septum of the nose. On either side of this Lamella are irregular openings leading into the **Sphenoid Cells** or **Sinuses**. These are 2 large irregular cavities hollowed out of the interior of the body of the Sphenoid, which communicate with the upper and back part of the nose.

The Posterior surface articulates with the **Basilar process** of the Occipital bone. During childhood these bones are separated by a layer of cartilage, but between the ages of 20-25 years this becomes ossified and the 2 bones then form one piece.

The two Lateral surfaces give off on either side the Greater and Lesser Wings. On the superior border of each lateral surface we see a groove, called: **Cavernous Groove**, which lodges: **the Cavernous Sinus**, and the **Internal Carotid Artery**.

The Inferior surface presents in the middle line a triangular spine, called: **the Rostrum**, and on either side a projecting Lamina, called: **the Vaginal processes**, which three articulate with the Vomer.

Close to the root of the **Pterygoid processes**, which are given off from the inferior surface, we see a groove, formed into a complete canal by the **Sphenoidal process of the Palate** bone, called: **Pterygo-palatine canal**, which transmits the Pterygo-palatine vessels and the pharyngeal nerve.

The Superior surface presents in the median line most anteriorly the **Ethmoidal Spine** for articulation with the Ethmoid, then follows a transverse groove: "**the Optic groove,**" which connects the 2 Optic Foramina, and which lodges the **Optic Commissure**. Behind the Optic groove comes the **Olivary process**, then the **Sella Turcica** or **Pituitary Fossa**, a deep depression, which lodges the **Pituitary body**. This Fossa is bounded on either side by the **Middle Clinoid processes**, and posteriorly by a square-shaped plate of bone, called: the **Quadrilateral plate of the Sphenoid**, terminating superiorly in the **Posterior Clinoid processes**.

The Lesser wings are thin triangular plates of bone, arising from the anterior upper and lateral part of the body of the Sphenoid. At their posterior and inner border they form the **Anterior Clinoid processes**.

The Greater Wings are strong, curved processes arising from the sides of the body. Each wing presents **3 surfaces**.

the **superior** or **cerebral** surface,

" **external** and

" **anterior** or **orbital** surface.

The Lesser and Greater Wings form on either side a triangular Foramen: "**the Sphenoidal Fissure**" or "**Foramen Lacerum Anterius**" descending downwards from the point, where the body and the Greater Wing unite. This foramen is otherwise called: **Foramen Lacerum Orbitale**. The best name for it would be: **Spheno-Frontal Foramen**, because it is formed by the Sphenoid and Frontal bones.

Each Pterygoid process consists of 2 plates:

the **External Pterygoid plate**, and

" **Internal** " "

These plates are separated by a deep notch, called: **Pterygoid Fossa.** The Internal Pterygoid plate ends in a hook-like process, called: “**the Hamular process,**” around which turns the tendon of the **Tensor Palati Muscle**; this muscle arises from the base of the Internal Plate, and above this is seen the posterior orifice of **the Vidian Canal.**

On the Superior surface of the Sphenoid bone we see on either side:

5 sometimes 6 pairs of Foramina;
these are (from anteriorly to posteriorly.)

- 1) **Optic Foramen**, transmitting the Optic Nerve, and Ophthalmic Artery;
- 2) **sphenoidal Fissure**, transmitting the 3d, 4th, the 3 branches of the first division of the 5th, the 6th Cranial Nerve, the Ophthalmic Vein, and Lachrymal Artery, and a fold of the Dura Mater;
- 3) **Foramen Rotundum**, transmitting the 2nd division of the 5th Cranial Nerve.
- 4) **Foramen Ovale**, transmitting the 3d division of the 5th Cranial nerve, the Small Meningeal Artery and the Superficial Petrosal Nerve.
- 5) **Foramen Spinosum**, transmitting the Middle Meningeal Artery, 2 Meningeal Veins, and filaments of the Sympathetic nerve from the Cavernus Plexus.
- 6) sometimes **Foramen Vesalii**, near the Cavernous groove, transmitting a little vein.

The Sphenoid bone gives attachment to **12 pairs of muscles** these are:

- | | | | | |
|----|---|---|---|---|
| 6. | { | Levator Palpebrae Superioris
Obliquus Superior,
Rectus Superior,
“ Inferior,
“ Externus,
“ Internus, | } | all the muscles
of the Orbit
except the Ob-
liquus Inferior. |
|----|---|---|---|---|

3. { **Temporal,**
External Pterygoid,
Internal, " } 3 of the muscles of mastication.
2. { **Superior Constrictor of the Pharynx,**
Tensor Palati, } muscles of deglutition.
1. { **Laxator Tympani,** muscle of the middle ear.

The **Sphenoid** bone is developed by **10 centres**

10. { 2 for the two Greater Wings,
2 " two Internal Pterygoid plates,
2 " posterior part of the body,
4 " anterior portion of the Sphenoid.

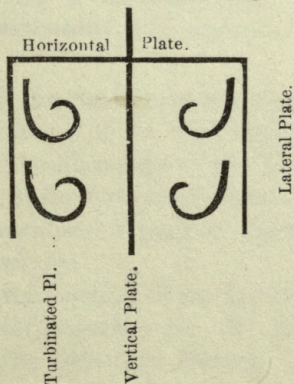
Ethmoid bone.

The Ethmoid bone (sieve like) forms a portion of the Anterior Fossa of the base of the Cranium; **it articulates with 13 bones**, viz:

all the bones of the upper jaw, except the 2 Malar, and with two bones of the Cranium, the Sphenoid and Frontal bones.

The Ethmoid bone consists of:

- a vertical plate,**
- a horizontal plate,**
- 2 lateral plates and**
- 2 turbinated plates** on either side.



The Upper portion of the vertical plate reaches into the Cranial cavity, and is called "**Crista Galli**;" to it is attached the **Falx Cerebri**, (a fold of the Dura Mater, that separates the two hemispheres of the Cerebrum.)

The lower portion of the vertical plate separates the two nasal cavities.

The Horizontal plate of the Ethmoid is situated between the 2 Orbital plates of the Frontal bone, and presents on either side from 10 to 15 little openings, through which pass the filaments of the **Olfactory Nerve**. From the sieve-like appearance of this plate the name "**Ethmoid**" is derived, and especially the horizontal plate called : **Cribriform plate**.

The turbinated bones on either side are the superior and middle turbinated bones of the nose. *

* There is also an inferior turbinated bone, which however forms a separated bone for itself. The **3 turbinated bones** divide the nasal cavity into the **superior, middle and inferior meatus** (on either side).

Each of the **Lateral Plates** consists of an outer plate (**Os Planum**), which forms a part of the Orbit and an inner plate, which forms a part of the Nasal Fossa. Between these two plates are a number of thin walled cellular cavities, **Ethmoidal cells**, interposed. The **posterior Ethmoidal cells open into the nose**.

The Ethmoid bone serves for 5 purposes :

- 1) for the attachment of the Falx Cerebri.
 - 2) it transmits the filaments of the Olfactory Nerves, or the first pair of the Cranial Nerves.
 - 3) it forms a considerable part of the Septum and walls of the Nasal cavity.
 - 4) it forms a large portion of the Orbit.
 - 5) it affords a large surface for the distribution of the filaments of the Olfactory Nerves.
-

Frontal bone.

The Frontal bone resembles a cockle-shell and forms the anterior portion of the Cranium. It may be divided into 2 portions: the **Vertical**, and the **Horizontal** or Orbito-Nasal portion.

The Vertical portion presents an exterior and interior surface.

The exterior surface is convex and shows on either side an eminence, called: the **Frontal Eminence**.

A little below these we see a ridge, called: the **Superciliary Ridge**.

Below this ridge we see on either side a bony arch, called: **Supraorbital Arch**. In this arch or sometimes a little above it we find a notch, or often a Foramen, called: **Supra-orbital Notch** or Foramen, through which pass the Supra-orbital artery, vein and nerve.

The Supra-orbital Arch is bounded externally by the **External Angular process**, which articulates with the Malar bone, and internally by the **Internal Angular process**, which articulates with the Lachrymal bone. Between the two internal Angular processes is the **Nasal Notch**, which articulates with the Nasal bone and Superior Maxillary bone. This notch is continuous with a long process, called: **Nasal Spine**.

The interior surface is concave. In the middle line we see a **groove** for the Superior Longitudinal sinus; at its lower end is a ridge, called: **Frontal Crest**. Below the Frontal Crest is a little foramen, called **Foramen Cæcum**, which transmits a little vein.

On either side of the groove we notice **depressions**, which lodge the **convolutions of the Cerebrum** and the Pachionian bodies and some **furrows** for the **Anterior Meningeal Artery**.

The Horizontal portion consists of two thin plates, (Orbital plates) which form the vaults of the orbits, separated one from the other by the Ethmoidal notch.

On the exterior surface of each **Orbital plate** we see at its internal part a depression, called : **Lachrymal Fossa** for the Lachrymal gland.

The interior surfaces of the Orbital plates present elevations and depressions for the convolutions of the brain.

The Frontal bone is partly hollowed out by 2 cavities, called ; “**Frontal Sinuses**,” which communicate with the Nasal cavities by a narrow canal, called ; **Infundibulum**.

The Frontal Sinuses are lined with mucous membrane (the prolongation of the Schneiderian membrane of the nose), and are of importance in the following respects :

- 1) An **inflammation** of the mucous membrane of the nose (catarrh) may spread to the **Frontal Sinuses** and produce here a **dull headache**.
- 2) **Little insects** or particles of dust may reach the Frontal Sinuses from the nasal cavities by the Infundibulum, they may remain there and produce an irritation and inflammation.
- 3) In cases of **fracture** of the **internal table** of the **Frontal bone**, particles of **brainmatter** will come out through the nose, which will always be a sign of fracture.
- 4) **Never trephine** over the Sinuses.
- 5) In case the **external layer** of the bone over the Frontal Sinus should, by any accident be **broken** or destroyed an **emphysematous condition** of the forehead may be produced.
- 6) **Foreign bodies** as bullets may enter and **lodge** in these **Sinuses**.

The Frontal Sinuses as well as the other Sinuses of the cranial bones are developed after the age of puberty.

The entire amount of each dividend shall be paid to the shareholder who is entitled to it at the time the dividend is declared. The dividend shall be paid in cash or in kind, at the discretion of the Board of Directors.

The Board of Directors may, at its discretion, declare dividends in cash or in kind, and may also declare dividends in stock.

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The Frontal bone articulates with 12 bones, viz:

12.	{	2 Parietal, Sphenoid, Ethmoid,	}	4 of the Cranium.
		2 Nasal, 2 Superior Maxillary, 2 Lachrymal, 2 Malar.		
				8 of the Face.

To the Frontal bone are attached:

3 pairs of muscles, viz:

3. { Corrugator Supercilii,
Orbicularis Palpebrarum,
Temporal,

N. B.—In newborn children and in the first years of life the Frontal bone consists of 2 pieces.

The Frontal bone is developed by 2 centres: one for each lateral half.

Parietal bone.

Both bones form the roof and the sides of the skull.

Each bone is almost quadri-lateral and presents 2 surfaces and 4 borders.

The exterior surface is convex, smooth and marked about its centre by an eminence, called "**Parietal eminence.**" Crossing the middle of the bone in an arched direction is the **Temporal ridge** for the attachment of the Temporal Fascia. Above this ridge the bone is covered by the Aponeurosis of the Occipito-Frontalis, below it affords attachment to the Temporal M. Sometimes near to the upper border a Foramen is present, called ; **Parietal Foramen**, which transmits a vein to the Superior Longitudinal Sinus.

The interior surface is concave and presents eminences and depressions for the convolutions of the brain and numerous furrows for the ramifications of the Meningeal arteries.

The **Anterior Border** articulates with the Frontal bone.

The **Superior Border** with the Parietal bone on the other side.

The **Posterior Border** with the Occipital bone.

The **Inferior Border** with the Sphenoid and Temporal bones.

The Parietal bone articulates with 5 bones :

- | | | |
|----|---|--------------------|
| 5. | { | Occipital bone, |
| | | Sphenoid “ |
| | | Frontal “ |
| | | Temporal “ |
| | | Opposite Parietal. |

Each **Parietal bone** gives attachment to **1 Muscle** :
the Temporal M., and is developed by one centre of ossification.

Temporal bone.

The Temporal bone forms the side and base of the skull ; it may be divided into 3 portions, viz: the Squamous, Mastoid and Petrous portion.

- 1) **The Squamous portion** forms the anterior and upper part, is scale-like and thin. On the lower portion we see a process running forwards, called : **Zygomatic process,**” which articulates with the Malar bone, and gives attachment to the **Masseter Muscle**. On the root of the Zygomatic process we see a Fossa “the **Glenoid Fossa,**” which is divided into an anterior and posterior portion by a fissure, called “**the Glaserian fissure.**” The anterior portion of the Fossa serves for articulation with the **condyle of the Lower jaw**. The posterior portion lodges the **Parotid gland**.

The **Glaserian fissure** leads into the Tympanum and lodges the Laxator Tympani M: and the Tympanic branch of the Internal Maxillary Artery.

The interior surface of the Squamous portion presents eminences and depressions for the convolutions of the brain and grooves for the branches of the Middle Meningeal Artery. (Large Meningeal Artery.)

- 2) **The Mastoid portion** forms the posterior part of the bone. It presents a thick, short process, called : **Mastoid process,** appearing like a nipple. Behind

The posterior border with the Occipital bone.
The anterior border with the Sphenoid and Temporal bones.

The external bone articulates at its 5 bones:

- 1. Occipital bone
- 2. Sphenoid
- 3. Frontal
- 4. Temporal
- 5. Zygomatic Parietal

Each parietal bone gives attachment to 1 muscle; the Temporal M., and is developed by one centre of ossification.

Temporal bone.

The Temporal bone forms the side and base of the skull. It may be divided into 3 portions viz: the Sphenoid, Mastoid and Zygomatic portions.

1) The sphenoid portion forms the anterior and upper part of the side of the skull. On the lower portion we see a process running forwards called: Xygnathoid process, which articulates with the Malar bone and gives attachment to the Masseter muscle. On the root of the Xygnathoid process we see a fossa, the "Mastoid Fossa", which is divided into an anterior and posterior portion by a fissure, called: the "Mastoid Fissure". The anterior portion of the fossa serves for articulation with the condyle of the lower jaw. The posterior portion lodges the Tympanic gland.

The Xygnathoid process leads into the Tympanum and lodges the Tensor Tympani M.; and the Tympanic branch of the Internal Maxillary Artery.

The inferior surface of the sphenoid portion presents eminences and depressions for the convolutions of the brain and grooves for the branches of the Middle Meningeal Artery. A large blood vessel, the Middle Meningeal Artery, is also seen.

2) The mastoid portion forms the posterior part of the bone. It presents a thick short process, called: the "Mastoid process", which appears like a nipple. Behind

this is a deep groove, called : "**the Digastric Fossa**" for the attachment of the Digastric Muscle. Posterior to the Digastric Fossa we see another groove : **the Occipital groove** for the Occipital Artery. Behind this we find sometimes a Foramen, called : "**Mastoid Foramen**," which transmits a little vein. The Mastoid portion is hollowed out by many little cells, which connect with the middle ear, called, "**Mastoid cells**."

- 3) **Petrous portion** forms a triangular pyramid, situated with its base outwards and its apex towards the Basilar process of the Occipital bone.

It presents for examination a **base, an apex and 3 surfaces**, and contains in its interior, the essential parts of the organs of hearing. The base shows an expanded orifice : the **Meatus Auditorius Externus**, which leads into the Tympanum or middle ear. The apex is received into the interval between the Spinous process of the Sphenoid and the Basilar process of the Occipital. It presents the anterior orifice of the Carotid canal, and forms the posterior boundary of the Foramen Lacerum Medium.

The Petrous portion presents 3 surfaces, called : the anterior, posterior and inferior.

The Anterior Surface shows :

- 1) an eminence for the Superior Semi-circular canal,
- 2) the Hiatus Fallopii,
- 3) an opening for the Smaller Petrosal Nerve,
- 4) a depression for the Casserian Ganglion,
- 5) the Carotid canal.

The Posterior surface shows :

- 1) a little opening for the Aquaeductus Vertibuli,
- 2) **Meatus Auditorius Internus**, which transmits the 7th and 8th Cranial Nerves.

The inferior surface shows :

- 1) an opening for the Carotid canal,
- 2) a canal for Jacobson's Nerve,
- 3) Aquaeductus Cochleae,
- 4) a canal for Arnold's Nerve,
- 5) Jugular Fossa,
- 6) Vaginal process,
- 7) Styloid process,
- 8) Stylo-Mastoid Foramen.
- 9) Auricular fissure.

The Temporal bone articulates with 5 bones :

5. { Occipital bone,
Parietal "
Sphenoid "
Inferior Maxillary,
Malar "

The Muscles attached to the Temporal bone
are 14 in number :

- 1) **To the Squamous portion,** and to the Zygoma 2 : { Temporal Muscle,
Masseter. "

- 2) **To the Mastoid portion** 6 : { Occipito-Frontalis Muscle
Sterno-Cleido-Mastoid, "
Splenius Capitis, "
Trachelo-Mastoid, "
Digastricus, "
Retrahens Aurem. "

- 3) **To the Petrous portion,** { Levator Palati, "
Tensor Tympani, "
Stapedius. "
and
to the Styloid process 6 : { Stylo-Pharyngeus "
Stylo-Hyoideus "
Stylo-Glossus "

Foramina in the Temporal bone, 16 in number.

1) **Squamous P,**₂ { **Fissure of Glaser** [Laxator Tympani and Tympanic branch of Internal Maxillary Artery].
Canal of Huguier [Chorda Tympani Nerve],

2) **Mastoid P,** 1: { **Mastoid Foramen**, [for a little vein], sometimes not present.

{ Anterior sur- { **Hiatus Fallopii** [Petrosal branch of Vidian Nerve],
face 2: { **Opening for the Lesser Petrosal Nerve**.
Posterior { **Meatus Auditorius Internus** [7th and 8th Cran. N. and Auditory Artery]
surface 2: { **Aquaeductus Vestibuli** [small artery and vein].
{ **Auricular fissure** [auricular branch of Pneumogastric Nerve],
{ **Stylo-Mastoid Foramen** [Facial Nerve and Stylo-Mastoid Artery],
{ **Canal for Arnold's Nerve**.

3) **Petrous P,** 11

{ Inferior sur- { **Opening for Jacobson's Nerve**.
face, 6: { **Aquaeductus Cochleae** [a little vein],
{ **Carotid canal** [Internal Carotid Artery and Carotid Plexus],
Base 1: { **Meatus Auditorius Externus**.

4) **Angle,**₂

{ **Canal for Tensor Tympani Muscle**.
{ **Eustachian tube**.

The Temporal bone is developed by 4 centres :

- 1 for the Squamous portion,
- 1 " Petrous and Mastoid portion
- 1 " Styloid process,
- 1 " Auditory process.

The Auditory process joins with the Squamous portion about the time of birth.

Superior Maxillary bone assists in the formation of 3 cavities : the mouth,

“ nose, and

“ orbit,

and enters into the formation of 2 Fossae :

the Zygomatic, and

the Spheno-maxillary Fossa.

The Superior Maxillary bone presents for examination : **a body and four processes** : the malar, nasal, alveolar and palatine processes.

The body is hollowed out and forms a large cavity, the **Antrum of Highmore**. On the external surface of the body we notice a depression, the **Canine Fossa**, which gives attachment to the Levator Anguli Oris. Above this is the **Infra Orbital Foramen**, which transmits the Infra Orbital Nerve and Artery.

The posterior surface of the body forms a part of the Zygomatic Fossa.

The superior surface forms a part of the orbit, and presents the **Infra-Orbital groove** for the Infra-Orbital Nerve and Artery.

The **Antrum of Highmore** connects with the nasal cavity. (Middle Meatus of the nose.)

On the inner surface just below the Inferior Meatus of the nose is a sharp process, called the **Anterior Nasal spine**.

The **Palate process** shows the **Anterior Palatine canal** for the anterior palatine vessels.

The Superior Maxillary bone articulates with

9 bones :

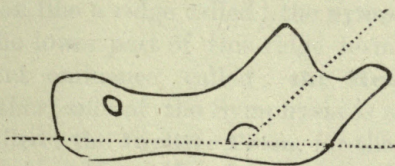
9 { Frontal,
Ethmoid,
Nasal,
Malar,
Lachrymal,
Inferior turbinated,
Palate,
Vomer,
Superior Maxillary of the other side.

The Superior Maxillary bone gives attachment to **9 muscles** :

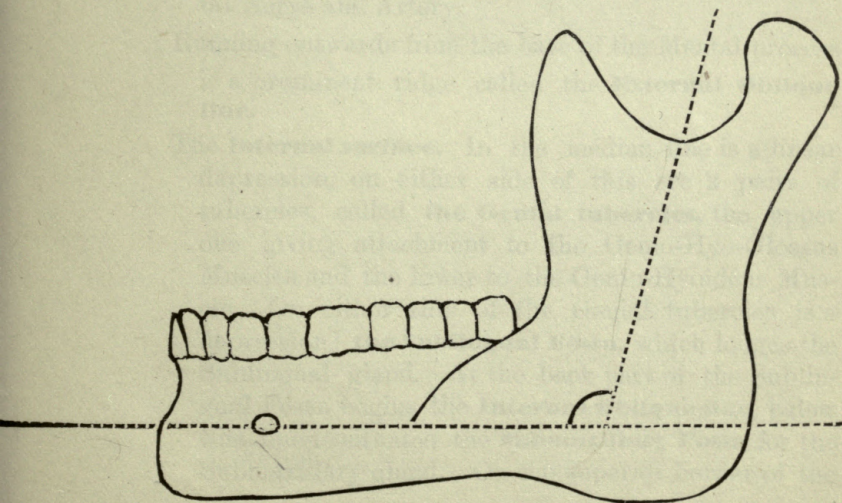
- 9 { Orbicularis Palpebrarum,
Inferior Oblique of the eye,
Levator Labii Superioris Alaeque Nasi,
“ “ “ Proprius,
“ Anguli Oris,
Compressor Nasi,
Depressor Alae Nasi,
Masseter,
Buccinator.

Inferior Maxillary bone consists of 2 portions :
a Body and 2 Rami or perpendicular portions, which
unite and form an obtuse angle. In the adult this
angle becomes nearly a **right angle**. In children and
old people this angle gets **larger**.

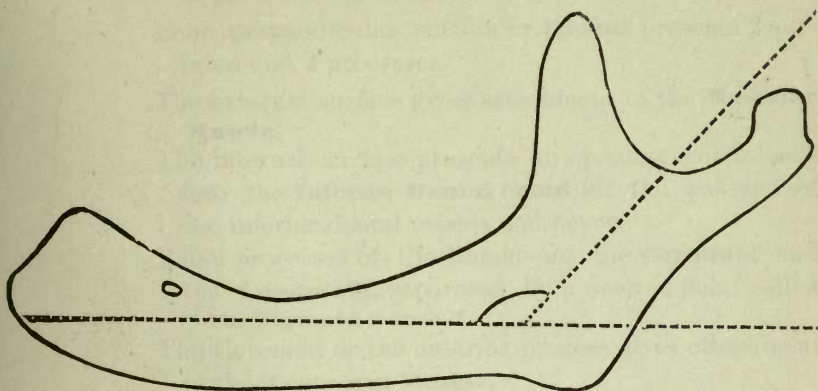
AT BIRTH.



IN ADULTS.



IN OLD AGE.



The body or horizontal portion is nearly horse-shoe shape, and consists in the earliest years of childhood of 2 parts, which unite forming the **Symphysis of the lower jaw.**

The external surface of the body presents in the median line a ridge called: the **Symphysis** of the bone. The lower part of this ridge terminates in a prominent eminence, called: **the Mental process.** On either side of the Symphysis is a little depression, called: the **Incisive Fossa**, for the attachment of the Levator Menti Muscle. Externally to this Fossa we see a Foramen: **the Mental Foramen** for the Mental Nerve and Artery.

Running outwards from the base of the Mental process is a prominent ridge called the **External Oblique line.**

The internal surface. In the median line is a linear depression, on either side of this are 2 pairs of tubercles, called **the Genial tubercles**, the upper one giving attachment to the Genio-Hyo-Glossus Muscles and the lower to the Genio-Hyoideus Muscle. On either side of the Genial tubercles is a depression: **the Sublingual Fossa**, which lodges the Sublingual gland. At the back part of the Sublingual Fossa begins the **Internal Oblique line**, below this line is situated the **Submaxillary Fossa** for the Submaxillary gland. On the superior border of the

horizontal portion we see the alveolar processes and depressions for the teeth.

Each perpendicular portion or **Ramus** presents 2 surfaces and 2 processes.

The external surface gives attachment to the **Masseter Muscle**.

The internal surface presents an opening, which leads into the **Inferior Dental canal** for the passage of the inferior dental vessels and nerve.

The 2 processes of the Ramus are the **Coronoid** and the **Condylod**, separated by a deep notch, called "**the Sigmoid notch**."

The Coronoid or the anterior process gives attachment to the **Temporal Muscle**.

The Condylod or posterior process articulates with the Temporal bones and gives on its inside attachment to the **External Pterygoid Muscle**.

The lower border of the Ramus is called at its junction with the horizontal portion the **Angle of the lower jaw**, and this gives on its innerside attachment to the Internal Pterygoid Muscle.

The Inferior Maxillary bone articulates with 2 bones: the 2 Temporal bones, and gives attachment to 14 Muscles.

Levator Menti, Depressor Labii Inferioris, Depressor Anguli Oris, Platysma Myoides, Buccinator, Masseter, Genio-Hyo-Glossus, Genio-Hyoideus, Mylo-Hyoideus, Digastric, Superior Constrictor, Temporal, Internal and External Pterygoid.

Lachrymal bone is the smallest and most fragile bone of the face; it resembles in form and size a finger nail, and for this reason is sometimes called **Os Unguis**. The orbital surface of the bone is divided by a vertical ridge into 2 parts, which by uniting with the Nasal processes of the Superior Maxillary bone form: **the Lachrymal groove**. The upper part of this groove lodges **the Lachrymal sac**; the lower part helps to form **the Lachrymal canal**.

The Lachrymal bone articulates with 4 bones :
Frontal, Ethmoid, Superior Maxillary and Inferior
Turbinated.

The bone gives attachment to one Muscle: the Tensor
Tarsi Muscle.

Malar bone forms the prominence of the cheek. The
bone presents 2 surfaces: the external and the inter-
nal.

It presents 4 processes :

the Frontal process,
“ Orbital “
“ Maxillary “
“ Zygomatic “

From the orbital portion of the bone to the external
surface leads a canal: **the Temporo-Malar canal**,
for the filaments of the orbital branch of Superior
Maxillary Nerve.

The Malar bone articulates with 4 bones :

4 { Frontal,
Sphenoid,
Temporal,
Superior Maxillary.

To the Malar bone are attached **5 Muscles**.

5 { Levator Labii Superioris Proprius,
Zygomaticus Major,
“ Minor,
Masseter,
Temporal.

Palate bone is situated at the backpart of the Nasal
Fossa, wedged between the Superior Maxillary bone
and the Pterygoid processes.

It articulates with 6 bones :

Sphenoid, Ethmoid, Superior Maxillary, Inferior
Turbinated, Vomer and the other Palate.

The Lachrymal bone articulates with 4 bones:
Frontal, Ethmoid, Superior Maxillary and Inferior
Turbinate.
The bone gives attachment to one Muscle, the Tensor
Tarsi Mucosae.

Malair bone articulates with 4 bones:
Frontal, Ethmoid, Superior Maxillary and Inferior
Turbinate.

It gives attachment to 4 muscles:
The Lacrimal process of the Superior
Maxillary.
The Lacrimal process of the Inferior
Maxillary.
The Lacrimal process of the Middle
Turbinate.

From the inferior portion of the bone to the external
surface leads a canal, the Temporo-Malar canal,
for the filament of the orbital branch of Superior
Maxillary Nerve.

The Malar bone articulates with 4 bones:

Frontal
Sphenoid
Temporal
Superior Maxillary

To the Malar bone are attached 2 Muscles:
Levator Labii Superioris Proprius
Zygomaticus Major
Zygomaticus Minor
Masseter
Temporal

Palate bone is situated at the back part of the Nasal
Cavity, and is united to the Superior Maxillary bone
and the Pterygoid process.

It articulates with 4 bones:
Sphenoid, Ethmoid, Superior Maxillary, Inferior
Turbinate, Vomer and the other Palate.

It gives attachment to 4 Muscles :

Tensor Palati,
Azygos Uvulae,
External Pterygoid,
Internal “

Nasal bones. They are situated side by side at the middle and upper part of the face, forming by their junction the bridge of the nose.

Each Nasal bone articulates with 4 bones, viz :

4 { Frontal,
Ethmoid,
Opposite Nasal,
Superior Maxillary.

There are no muscles attached to it.

Vomer is a single bone, situated vertically at the back-part of the Nasal Fossa, forming a part of the Septum of the nose. It is thin, somewhat like a plough-share in form.

On either side of it is a groove for the **Naso-Palatine Nerve**. The superior border presents a deep groove, bounded on each side by a horizontal projecting Ala of bone. The groove receives the Rostrum of the Sphenoid, whilst the Alae are retained by the vaginal processes of the Sphenoid.

The Vomer articulates with 6 bones, viz :

Sphenoid, Ethmoid, 2 Superior Maxillary, and the 2 Palate bones.

To the Vomer are no muscles attached.

The Interior or Cerebral surface of the Base of the Skull presents 3 Fossae :

1. The **Anterior Fossa** is formed by the Frontal, Ethmoid and Sphenoid bones.
 2. The **Middle Fossa** is formed by the Sphenoid, Temporal and Parietal bones.
 3. The **Posterior Fossa** is formed by the Occipital Temporal and Parietal bones.
-

The Foramina seen on the interior surface

of the Skull are from 33 to 44 in number , of these are 2 on the **Vertex: Parietal Foramina ***
(transmitting a little vein.)
and 33 to 42 **at the Base of the Skull.**

The Foramina at the Base may be classified in the following manner :

2 single Foramina (situated in the median line)

2. { ***Foramen Caecum** for a little vein,
 Foramen Magnum, transmitting:

Medulla Oblongata and its membranes,
2 Spinal Accessory Nerves and
2 Vertebral Arteries,

16-20 Foramina in pairs; of these are :

A. In the anterior Fossa, 5 pairs:

- 1) **A slit-like opening, Ethmoidal fissure** for the Nasal branch of the Ophthalmic Nerve and the¹ Nasal branch of the Anterior Ethmoidal artery.
- 2) **The Anterior Ethmoidal Foramen** for the Nasal Nerve and the Anterior Ethmoidal Artery.

2. The Posterior Ethmoidal Foramen for the Posterior

The Interior of Cerebral surface of the Base

of the Skull presents 3 Foramina:

1. The Anterior Foramen is formed by the Frontal, Ethmoidal and Sphenoidal bones.

2. The Middle Foramen is formed by the Sphenoidal, Temporal and Parietal bones.

3. The Posterior Foramen is formed by the Occipital, Temporal and Parietal bones.

The Anterior Foramen is formed by the Frontal, Ethmoidal and Sphenoidal bones.

The Middle Foramen is formed by the Sphenoidal, Temporal and Parietal bones.

The Posterior Foramen is formed by the Occipital, Temporal and Parietal bones.

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The Anterior Foramen is formed by the Frontal, Ethmoidal and Sphenoidal bones.

The Middle Foramen is formed by the Sphenoidal, Temporal and Parietal bones.

The Posterior Foramen is formed by the Occipital, Temporal and Parietal bones.

- 3] **The Posterior Ethmoidal Foramen** for the Posterior Ethmoidal Artery and Vein.
- 4] **The Cribriform openings** of the Ethmoid for the filaments of the Olfactory Nerves.
- 5] **The Optic Foramen** for the Optic Nerve and Ophthalmic Artery.

B. In the middle Fossa, 8 pairs:

- 1] **Sphenoidal Fissure** or **Foramen Lacerum Anterior**, or better **Spheno-Frontal Foramen** transmitting the 3d, 4th, the 3 branches of the first division of the 5th Cranial Nerve, the 6th Cranial Nerve, the Lachrymal Artery or a branch of it, the Ophthalmic Vein, and a fold of the Dura Mater
- 2] **Foramen Rotundum** for the 2nd division of the 5th Cranial Nerve.
- 3] **Foramen Ovale** for the 3d division of the 5th Cranial Nerve and Small Meningeal Artery.
- 4] **Foramen Spinosum** for the Middle Meningeal Artery, 2 Meningeal Veins and Small Petrosal Nerve.
- 5] **Foramen Lacerum Medium** for the Internal Carotid Artery, the Carotid plexus, the Large Petrosal Nerve and a Meningeal branch from the Ascending Pharyngeal Artery.
- 6] **Hiatus Fallopii** for the Petrosal branch of the Vidian Nerve and a branch of the Middle Meningeal Artery.
- 7] **A little opening** for the Lesser Petrosal Nerve.
- 8]* **Foramen Vesalii** for a little vein.

C. **In the posterior Fossa**, 7 pairs :

- 1] **Aqueductus Vestibuli** for a small vein and artery.
- 2]* **A triangular depression** which lodges a process of the Dura Mater, and through which passes sometimes a small vein.
- 3] **Meatus Auditorius Internus** for the Facial and Auditory Nerves and Auditory Artery, branch of the Basilar.
- 4] **Foramen Lacerum Posterius** (Occipito--Petrosal) for the 9th, 10th, 11th pairs of Cranial Nerves, and for the blood forming the Internal Jugular Vein.
- 5] **Anterior Condylloid Foramen** for the Hypoglossal Nerve and a small Meningeal branch of the Ascending Pharyngeal Artery.
- 6]* **Posterior Condylloid Foramen** for a small vein.
- 7]* **Mastoid Foramen** for a small vein.

* The Foramina marked with * are sometimes not present.

SUTURES.

The bones of the Cranium and Face are connected to each other by means of **Sutures** (belonging to the class of joints called : Synarthrosis), except one : the inferior Maxillary with the Temporal bones. To find out the number of the Cranial Sutures : we add the articulation of the the Cranial bones with Cranial bones and divide by 2.

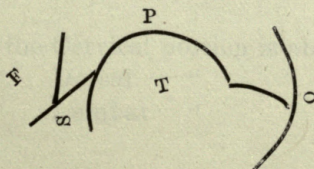
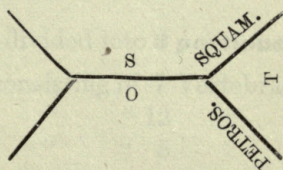
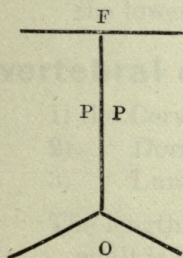
Occipital bone, with	5	} 34 divided by 2=17.
Sphenoid “ “	7	
Ethmoid “ “	2	
Frontal “ “	4	
2 Temporal “ “	6	
2 Parietal “ “	10	

The **Cranial Sutures** are 17 in number, and may be arranged in three groups, viz. :

- 1) At the **Vertex** 5, or 1 single and 2 pairs,
 - 2) At the **Base** 8, or 4 “ “ 2 “
 - 3) At the **Side** 4 or no “ “ 2 “
- in all : 17, or **5 single** and **6 pairs**.

5 Single Sutures. { Inter Parietal or Sagittal, (Vertex),
Basilar,
Spheno-Ethmoidal,
Spheno-Frontal,
Fronto-Ethmoidal } **at the Base.**

6 Pair Sutures. { Vertex 2. { Fronto-Parietal or Coronal,
Occipito-Parietal or Lambdoidal,
Side 2. { Spheno-Parietal, { Squamo-Parietal,
Temporo-Parietal. { Mastoid-Parietal,
Base 2. { Spheno-Temporal { Spheno-Petrosal,
Occipito-Temporal { Spheno-Squamo,
Occipito-Petrosal,
Occipito-Mastoid.



Transverse Sutures are the Sutures between the Frontal bone and the bones of the Orbit, viz. :

Fronto-Nasal,
“ Maxillary,
“ Lachrymal,
“ Ethmoid,
“ Sphenoid,
“ Malar.

The Scalp is formed by **5 tissues** :

- 1) Integument,
 - 2) Adipose tissues,
 - 3) Tendon of Occipito-Frontalis muscle.
 - 4) Areolar tissues,
 - 5) Pericranium.
-

TRUNK.

Vertebral column consists of 24 bones, each called “**a Vertebra.**” The Vertebrae are situated in the median line of the body, and the whole column forms a **wavelike line**, that is to say the upper portion is convex anteriorly, the middle portion concave and the lower portion convex again anteriorly.

The vertebral column is divided into **3 portions** :

- 1) the Cervical portion consisting of 7 Vertebrae,
- 2) “ Dorsal “ “ “ 12 “
- 3) “ Lumbar “ “ “ 5 “

The length of the whole vertebral column in an average adult is **about 23**, or $\frac{1}{3}$ of the whole length of the body.

The length of the Cervical portion is about 5 inches.

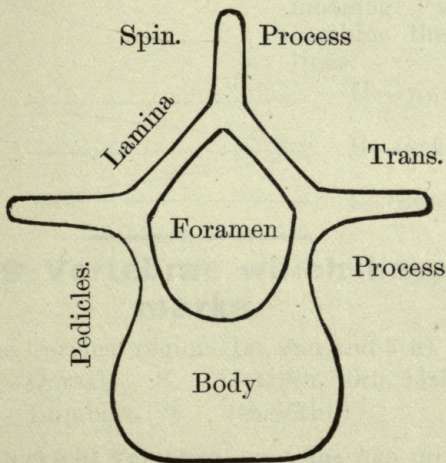
“	“	“	Dorsal	“	“	11	“
“	“	“	Lumbar	“	“	7	“
						<hr/>	
						23	“

The Vertebrae are numbered from above downwards with regard to their region, so we have the 1st, 2nd, etc., Cervical Vertebra, the 1st, 2nd to the 12th Dorsal Vertebra, etc.

The Vertebrae have three different characters :

- 1) **A General Character**, or marks by which we can ascertain if a certain bone is a Vertebra or not.
- 2) **A Regional Character**, or marks by which we can find out to what region a Vertebra belongs.
- 3) **A Special Character**, or marks by which we can tell what position a certain Vertebra in a certain region occupies.

The General Character of a Vertebra, is that the bone has a **Body**, a **Foramen**, **Processes** (7: one spinous, 2 lateral, 2 superior articulating, and 2 inferior articulating processes), 2 Pedicles, 4 Notches and 2 Laminae.



The Regional Character of a **Cervical Vertebra** is that it has a Foramen at the base of the lateral process.

These foramina (vertebral) of the Cervical vertebrae form a bony canal. Through the portion formed by the 6 or 5 upper vertebrae pass the

Vertebral artery,
Vertebral vein,
and the Vertebral plexus of nerves.

These Vertebral foramina are really formed by rudimentary ribs.

The Regional Character of a **Dorsal** Vertebra is that it has facets on its body for the articulation with ribs.

The Regional Character of a **Lumbar** Vertebra is that it has no Foramen at the base of the lateral or transverse process, and no facets on its body.

The Superior Articulating processes of the Vertebrae in the different regions have different directions.

Those of the Cervical Vertebrae go upwards and backwards.

“ “ Dorsal “ “ backwards.

“ “ Lumbar “ “ inwards and backwards.

In order to remember this, write :

the first letters of the region of the Vertebrae on one side and opposite to these the letters U. B. I. (latin word ubi, meaning “where”) and combine the letters by lines.

C (ervical)	_____	U—(pwards.)
D (orsal)	_____	B—(ackwards.)
L (umbar)	_____	I—(nwards.)

There are 9 Vertebrae which have special marks.

3 are in the Cervical region (1st, 2nd and 7th).

5 “ “ Dorsal “ (1st, 9th, 10th, 11th, 12th).

1 is “ Lumbar “ (the 5th).

The first Cervical Vertebra or **Atlas** has no body, but it has :

a rudimentary spinous process, and
long transverse processes.

The 2d Cervical Vertebra or **Axis** has an odontoid process on its superior surface, which takes the place of the wanting body of the Atlas. It has a strong spinous process.

The 7th Cervical Vertebra, or **Vertebra Prominens**, so-called, because it has the most prominent spinous process of all the Vertebrae, which forms its special mark.

The first Dorsal Vertebra has on its body one full facet and a half, (for the articulation with the 1st and 2d rib).

The 9th Dorsal Vertebra has on its body only half a facet, (for the articulation with the 9th rib).

The 10th Dorsal Vertebra has one facet on its body, and another on the transverse process.

The 11th Dorsal Vertebra has on its body one facet, and no facet on the transverse process.

The 12th Dorsal Vertebra has on its body one facet, but no facet on the transverse process, and the inferior articulating processes stand more sideways and are more distant one from another.

The 5th Lumbar Vertebra can be distinguished from the other Lumbar Vertebrae by its smaller spinous process, and by the position of the inferior articulating processes, which stand more sideways than anteriorly.

Points of Interest Connected with Special Vertebrae.

1st Cervical Vertebra: Obliquus Sup.—Rectus Capt. Post. Minor.—**Medulla Oblongata ends; Spinal Cord begins.**—Rect. Capt. Ant. Minor, lower attachment.—Rectus Lateralis, Longus Colli, (upper border.)

2nd Cervical Vertebra : Obliquus Inferior.—Rect. Capt. Post. Major.—Hypoglossal Nerve passes the Internal Carotid Artery, Lingual Nerve crosses the External Carotid Artery, upper attachment of Scal. Med. (2-7, Cervical Vertebra.)

3d Cervical Vertebra : Upper border of Thyroid Cartilage ; Common Carotid Artery ends ; External and Internal Carotid Artery begins ; Superior Cervical

Ganglion ; Superior Laryngeal Nerve, upper attachment of Rect. Capt. Anticus Major.—Scalenus Anticus (3, 4, 5, 6, Cervical Vertebra).

5th Cervical Vertebra : Lower border of Larynx and Pharynx.—Upper border of Trachea and Oesophagus.—Middle Cervical Ganglion.—Upper attachment of Scalenus Posticus.

7th Cervical Vertebra : Rhomboideus Minor.—Serratus Post. Superior, upper border.

1st Dorsal Vertebra : Rhomboideus Minor, and upper border of Rhomboideus Major.

2nd Dorsal Vertebra—Transverse portion of the Arch of Aorta.

3d Dorsal Vertebra—Trachea [divides into right and left Bronchi—Pulmonary Artery branches into right and left Pulmonary Arteries—Ductus Arteriosus.

4th Dorsal Vertebra—Lower border of Rhomboideus Major.

5th Resp. 6th Dorsal Vertebra—Base of the heart.

12th Dorsal Vertebra—Lowest border of Trapezius M. Diaphragm, Crurae, Aortic opening—Psoas Magnus and Parvus, upper attachment.

1st Lumbar Vertebra—Ligamentum Arcuatum Inter-
num.

2nd Lumbar Vertebra—Duodenum ends, Jejunum begins—Lower border of Pancreas, Mesentery, Receptaculum Chyli ends, Thoracic Duct begins—Duct Comm. Choledochus, Portal Vein—Vena Azygos Major—Superior Mesenteric Artery given off—Spinal cord ends, Cauda Equina begins—Solar Plexus—Ligam. Arcuatum Externum and Internum.

4th Lumbar Vertebra—Abdominal Artery ends, right and left Common Iliac Arteries begin—Sacra Media Artery.

Second Part of the Trunk :

THORAX.

Ribs: The ribs are 24 in number, and are divided into 3 regions :

- 1) **True Ribs** (the first 7.)
- 2) **False Ribs** (the next 3.)
- 3) **Floating Ribs** (the last 2.)

The ribs belong to the flat and pair bones, and are counted in numerical order from above downwards **without regard to the region in which they are situated.**

The True Ribs differ from the false in so far as they are connected with the Sternum by their own costal cartilage.

The False Ribs connect by costal cartilage with the last true rib.

The Floating Ribs do not articulate on their sternal end with any bone.

Each Rib may be divided into **3 portions :**

- 1) **The Vertebral End**, mostly one inch in length, presenting a head, a neck and a tuberosity ;
- 2) **The Middle Portion**, which is flat, presenting 2 surfaces and 2 borders. **On the inferior border we see a groove**, which lodges the intercostal vessels and nerve. This is of importance to recollect, so that in any case of Paracentesis Thoracis we may avoid the lower border of the ribs ;
- 3) **The Sternal End**, which presents a deepening for the costal cartilage.

There are **5 pairs of ribs with special marks:**

the 1st, 2d, 10th, 11th and 12th.

The peculiarity of the 1st rib is that it is short, the most curved of all the ribs, and that it presents on its head one facet, and on its superior surface two grooves for the Subclavian Artery and Vein; between these is a tubercle or ridge for the attachment of the Scalenus Anticus M.—**The Subclavian Vein is in front of the Scalenus Anticus, and the Subclavian Artery behind it.**

The 2d Rib, which is larger than the first, may be recognized by having the same curvature as the first, and by having two facets on its head.

The 10th Rib has one facet on its head, a tuberosity and an angle.

The 11th Rib has one facet on its head, no tuberosity, but an angle.

The 12th Rib has one facet on its head, no tuberosity and no angle.

The Sternum is a flat and symmetrical bone; it articulates with 16 bones, viz: the 14 true ribs and the 2 clavicles; **it gives attachment to 19 muscles** (9 pairs and one single: the Diaphragm).

The Sternum consists of 3 portions, viz:

- 1) the Manubrium (the handle).
- 2) the Gladiolus (little sword).
- 3) the Enciform Cartilage (like the point of a sword).

The Manubrium is the upper portion of the Sternum, and gives attachment to three pairs of muscles.

- 3 { Sterno-Cleido-Mastoid.
Sterno-Thyroid.
Sterno-Hyoid.

To the Gladiolus or middle portion (better to the whole Sternum) are attached:

- 2 { Anteriorly—Pectoralis Major, and
Posteriorly—Triangularis Sterni.

To the Enciform Cartilage are attached :

- | | | |
|---|---|--------------------------------|
| | { | Rectus Abdominis. |
| 4 | { | Obliquus Abdominis Externus. |
| | { | Obliquus Abdominis Internus. |
| | { | Transversalis Abdominis, and |
| 1 | | single Muscle : the Diaphragm. |

The Sternum is developed by 6, sometimes 10 points of ossification.

Third Part of the Trunk:

PELVIS.

Sacrum is a single, irregular bone, in the shape of a **triangular pyramid**, with its base upwards, and the apex downwards.

The Sacrum articulates with 4 bones :

- | | | |
|---|---|---------------------------|
| 4 | { | the last Lumbar Vertebra, |
| | { | “ Coccyx, and |
| | { | “ 2 Ossa Innominata. |

The Sacrum is hollow and curved anteriorly concave, and posteriorly convex. On its **anterior surface** we see 4 pairs of Foramina, called: “Anterior Sacral Foramina,” which transmit the Anterior Sacral nerves. On the **posterior surface** we see, in the same way, 4 pairs of Foramina, called: “Posterior Sacral Foramina,” for the Posterior Sacral Nerves. **The anterior Foramina are larger than the posterior**, because the Anterior Sacral Nerves are larger than the Posterior Sacral Nerves. **The anterior Foramina stand opposite to the posterior**, so that an instrument can easily pass through these from the outside to the inside of the Pelvis.

The anterior border of the **superior surface** or base of the Sacrum is called: The **Promontory** of the Sacrum.

The Sacrum in the female is straighter than that in the male. The Sacrum in the lower animals is straight.

The posterior surface of the Sacrum is convex, and presents a ridge in the median line, which forms the prolongation of the spinous processes of the Vertebrae.

The lateral surfaces present an irregular rough surface for the articulation with the Ossa Innominata, called: **auricular surface**.

The Sacrum **consists of 5 portions**, which unite and ossify at the age of puberty.

The name "Sacrum" means "holy," because the ancient people believed that this bone would resist decomposition, and around it would form on the day of resurrection the whole body.

The Sacrum gives attachment to 8 pairs of Muscles, viz:

8	{	Latissimus Dorsi,	} to the posterior surface.
		Erector Spinae,	
		Multifidus Spinae,	
		Gluteus Maximus,	
		Extensor Coccygis	
		Iliacus,—to the base,	
		Pyriformis,—to the anterior surface,	
		Coccygeus,—to the side.	

COCCYX, articulates with 1 bone: Sacrum. It consists of 3 or 4 little bones, which unite and ossify at the age of puberty. **Its articulation with the Sacrum becomes ossified at the age of about 25—30 years.** This is important for females which become pregnant for their first time after this age, because in such a case the Coccyx could not move, and the anterior-posterior diameter of the outlet would be about $\frac{3}{4}$ inches smaller than otherwise. Hence labor would be very tedious, and often fracture of the Coccyx will occur.

The Coccyx gives attachment to 5 pairs of Muscles:

5	{	Gluteus Maximus,
		Levator Ani,
		Sphincter Ani,
		Extensor Coccygis,
		Coccygeus.

Os Innominatum belongs to the pair and to the flat bones. Each of the 2 Ossa Innominata articulates with 3 bones, viz :

Sacrum,
Femur, and
the other Os Innominatum.

Both Ossa Innominata articulate with 3 bones also, viz :
the Sacrum, and
the 2 Femurs.

The Os Innominatum forms the lateral and anterior portion of the Pelvis, and gets the name from the circumstance, that the old anatomists could not find anything which it resembled.

Each Os Innominatum consists of 3 portions, viz :

Ilium or the superior portion,
Ischium or the inferior “ , and
Pubes or the anterior “ .

These 3 portions come together at the **Acetabulum**, or **Cotyloid cavity**, and become ossified at the age of puberty.

The Ilium forms a little less than $\frac{2}{5}$ of the Acetabulum ;
the Ischium, a little more than $\frac{2}{5}$; **the Pubes** a little more than $\frac{1}{5}$ of the Acetabulum.

The word “ Acetabulum ” means vinegar cup.

The Ilium presents for examination :
2 surfaces and 4 borders.

The names of the 2 surfaces are :
the external or Dorsal surface, and
the internal or Venter or Iliac Fossa.

The external surface is double curved, concave anteriorly and convex posteriorly, and presents 3 curved lines, called : **the superior, the middle, and inferior curved lines**, which give attachment to the Gluteus Maximus, Gluteus Medius and Gluteus Minimus Muscles.

The internal surface is smooth and concave ; it gives attachment to the Iliacus Muscle.

The anterior border presents 2 spinous processes, called : the **Anterior Superior** and **Anterior Inferior Spinous Process** of the Ilium. Between these 2 processes is a **notch**, through which passes out the **External Cutaneous nerve**.

To the Anterior Superior Spinous Process of the Ilium is attached :

- 1) Iliacus Muscle,
- 2) Poupart's Ligament,
- 3) Fascia Lata,
- 4) Tensor Vaginae Femoris Muscle,
- 4) Sartorius Muscle.

Poupart's Ligament is a fibrous band going from the Anterior Superior Spine of the Ilium to the Spine of the Pubes. From here it curves around the Ilio-Pectineal line to the Ilio-Pectineal eminence. This latter portion is called : **Gimbernat's ligament**.

Fascia Lata is the strong membrane which covers the Thigh.

To the Anterior Inferior Spinous Process of the Ilium is attached the straight head of the Rectus Femoris Muscle (its other head goes to the brim of the Acetabulum).

The upper border of the Ilium is otherwise called : the **Crest of the Ilium** ; it is rough, and presents 2 lips, an external and an internal. These give attachment to the majority of the ascending group of the Os-Innommatum.

The posterior border of the Ilium presents also 2 spinous processes, which are called the Posterior Superior, and Posterior Inferior Spinous Processes of the Ilium.

The inferior border of the Ilium forms :
the Great Sacro-Sciatic Notch.

The anterior border of the 2nd pharyngeal process is called the anterior margin and the posterior border is called the posterior margin. Between these 2 processes is a narrow, thin, which covers the whole of the pharynx.

To the anterior margin of the 2nd pharyngeal process is attached:

- 1) The 1st pharyngeal process.
- 2) The 2nd pharyngeal process.
- 3) The 3rd pharyngeal process.
- 4) The 4th pharyngeal process.

The 1st pharyngeal process is a broad, flat, which covers the whole of the pharynx. It is attached to the whole of the pharynx. The 2nd pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx. The 3rd pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx. The 4th pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx.

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The 2nd pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx.

The 3rd pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx.

The 4th pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx.

The 5th pharyngeal process is a narrow, thin, which covers the whole of the pharynx. It is attached to the whole of the pharynx.

Ischium forms the inferior portion of the Os-Innominatum. It presents for examination a Body with a Spine, a Tuberosity, and an Ascending Ramus. The Body forms a portion of the Acetabulum.

The Spine of the Ischium is directed posteriorly and inwards.

It gives attachment to :

- 1] the Lesser Sciatic Ligament,
- 2] the Gemellus Superior,
- 3] the Levator Ani,
- 4] the Coccygeus,

The Tuberosity of the Ischium is the most dependent portion of the Os-Innominatum ; it is rough in form, and gives attachment to :

the Sacro Sciatic Ligament,
the Gemellus Inferior Muscle,
the Biceps Flexor Cruris,
the Semitendinosus,
the Semimembranosus,
the Erector Penis,
the Crus Penis,
the Quadratus Femoris,
the Adductor Magnus,
the Transversus Perinei.

Pubes forms the anterior portion of the Os-Innominatum. The surface which articulates with the other Pubes is called "**Symphysis Pubis.**"

The Pubes bone presents for examination a Body, a horizontal Ramus and a descending Ramus. The superior border of the Body is called the **Crest of the Pubes.**

The horizontal Ramus ends in the Acetabulum, and the descending Ramus joins the ascending Ramus of the Ischium.

The Pubes and the Ischium form a large Foramen, called : **Obturator Foramen**, which in the body is covered with a membrane : **Obturator Membrane**. To this membrane is attached :

- { anteriorly, the Obturator Externus Muscle,
{ posteriorly, the Obturator Internus Muscle.

In the superior portion of the Obturator membrane is an opening and groove, called: Obturator groove for the Obturator vessels. The Obturator Foramen is otherwise called: the **Thyroid Foramen**.

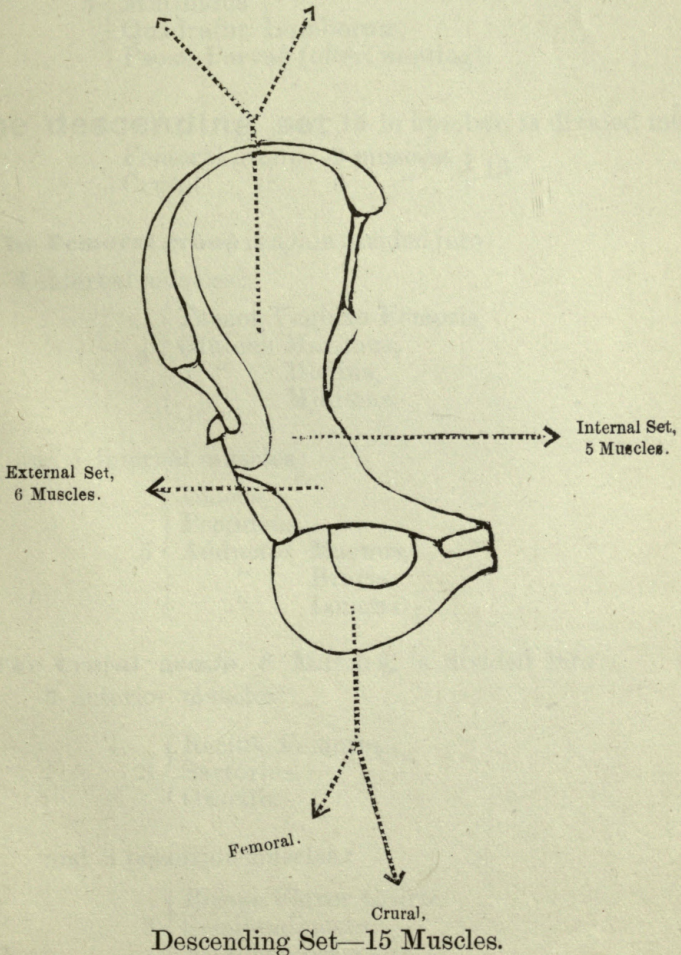
To the Os-Innominatum are attached 36 Muscles; these are divided into 4 sets, viz:

- | | | |
|-----------------------|-------------|---------------|
| 1) the ascending set, | 10 Muscles, | } 36 Muscles. |
| 2) " descending " | 15 " | |
| 3) " external " | 6 " | |
| 4) " internal " | 5 " | |

Ascending Set—10 Muscles.

Anterior Lateral

Posterior Lateral.



The ascending set is again divided into :

5 anterior lateral muscles :

5 { Rectus Abdominis,
Obliquus " Externus,
" " Internus,
Transversalis Abdominis,
Pyramidalis (sometimes wanting).

5 posterior lateral muscles :

5 { Latissimus Dorsi,
Erector Spinae,
Multifidus "
Quadratus Lumborum,
Psoas Parvus (often wanting).

The descending set 15 in number, is divided into :

Femoral group—9 muscles. } 15
Crural " 6 " }

The Femoral group is again divided into :

4 external muscles :

4 { Tensor Vaginae Femoris,
Gluteus Maximus,
" Medius,
" Minimus.

and 5 internal muscles :

5 { Iliacus,
Pectineus,
Adductor Magnus,
" Brevis,
" Longus.

The Crural group, 6 Muscles, is divided into :

3 anterior muscles :

3 { Rectus Femoris,
Sartorius,
Gracilis.

and 3 posterior muscles :

3 { Biceps Flexor Cruris,
Semitendinosus,
Semimembranosus.

The external set of the Os-Innominatum consists of 6 muscles:

- 6 { Piriformis,
Gemellus Superior,
Obturator Internus,
Gemellus Inferior,
Obturator Externus,
Quadratus Femoris.

The internal set of the Os-Innominatum consists of 5 muscles:

- 5 { Compressor Urethrae, } called :
Erector Penis, } the 3
Transversus Perinei, } Perinei Muscles.
Levator Ani, } forming the floor
Coccygeus. } of the Pelvis.

The Muscles of the External Set of the Os Innominatum produce external rotation in cases of fractures of the Neck of the Femur, and

the **Muscles of the Descending Set** of the Os Innominatum produce shortening in cases of fractures of the upper portion of the Femur.

The different objects situated under Poupart's ligament are:

- | | |
|----------------------------------|--|
| 4) Iliacus Muscle, | } counted up
from ex-
ternal to
internal
side. |
| 2) Psoas Magnus, | |
| 3) Pectineus Muscle, | |
| 1) External Cutaneous Nerve, | |
| 5) Anterior Crural Nerve, | |
| 6) Femoral Artery, | |
| 7) " Vein, | |
| 8) Opening for the Femoral ring, | |
| 9) Gimbernat's Ligaments. | |

Remember the word COVAN.

G—imbernat's Ligament,
O—pening,
V—ein,
A—rtery,
N—erve.

The Femoral Artery is situated just under the middle point of Poupart's ligament, outside of it is the Anterior Crural Nerve, inside of it is the Femoral Vein.

The Lesser Sacro-Sciatic ligament separates the **Greater Sacro-Sciatic Foramen** from the **Lesser**.

Through the Great Sacro-Sciatic Foramen passes :

		the Piriformis Muscle,
above the	{	“ Gluteal Vessels,
Piriformis.		“ Superior Gluteal Nerve.
		“ Sciatic Artery,
below the	{	“ Greater and Lesser Sciatic Nerves,
Piriformis.		“ Internal Pudic Vessels and Nerve, and a small Nerve to the Obturator Inter- nus Muscle.

The Lesser Sacro-Sciatic Foramen transmits :

{	the Obturator Internus Muscle,
	“ Internal Pudic Vessels and Nerve going back to the Pelvis.

The Sacrum is developed by 35 centres of ossification.

The Coccyx “ “ “ 4 “ “ “

The Os-Innominate “ “ 8 “ “ “

LOWER EXTREMITY.

The Lower Extremity consists of 30 bones, and to these are attached, 60 Muscles.

The Lower Extremity is divided into :

3 segments: Thigh, 1 bone : Femur,

Leg, 3	“	{ Patella, Tibia, Fibula.
Foot, 26	“	

30 bones.

The Foot is subdivided into 3 portions :

Tarsus, 7 bones.

Metatarsus, 5 “

Toes, (5 in number) 14 “

26 bones.

The Femur is the longest and strongest bone in the body.

It articulates with 3 bones, viz :

Os Innominatum,
Patella, and
Tibia.

The Femur is divided into 3 parts: the upper portion, the middle, and the lower portion.

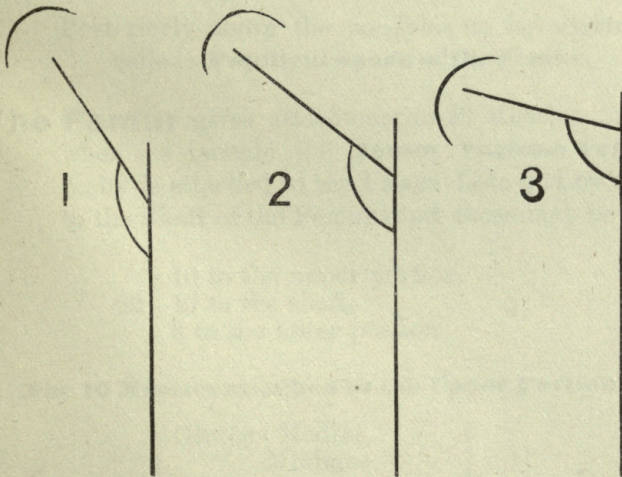
On the Upper Portion we see :

- 1) **A Head**, which is a little more than a hemisphere and which has a depression for the attachment of the **Ligamentum Teres**. (The other end of this ligament is connected with the **Acetabulum**.)
- 2) **A Neck**, forming with the shaft of the Femur an obtuse angle, which is largest in children, and which becomes smaller in old people.

In young children.

In adults.

In old age.



- 3) **A Greater Trochanter**, with its direction outwards and upwards.
- 4) **A Lesser Trochanter** with its direction downwards and inwards.
- 5) **The Digital Fossa**, internal to the Greater Trochanter.

The Middle Portion or shaft of the Femur is nearly cylindrical, with the exception of a longitudinal ridge on the posterior surface, called: "**Linca Aspera**," which presents 2 lips, an external and an internal lip. A little above the centre of the shaft is on the posterior surface the **Nutrient Foramen** for the nutrient vessels of the bone. **The direction of this Foramen is towards the Hip-joint.**

The Lower End of the Femur presents 2 condyles, an external and an internal condyle. The **Internal Condyle is greater and more dependent than the External.** Anteriorly to these condyles is a smooth surface for the articulation with the Patella, called "**Trochlea**." Between to 2 condyles is a notch, the **Intercondyloid Notch**, for the Crucial Ligaments and the Spine of the Tibia. On the outside of each condyle is a tubercle, which gives attachment to the external resp.: internal Lateral Ligament of the Knee-joint. **On the external surface of the External Condyle we see a groove for the Popliteus Muscle.**

Posteriorly above the condyles we see a triangular space, called: **Popliteal Space of the Femur.**

The Femur gives attachment to 23 Muscles, (or 24 muscles, when we include the **Tensor Vaginae Femoris**, which really is attached to the Fascia Lata and by means of this to the Shaft of the Femur,) and these may be divided into:

$$23 \left\{ \begin{array}{l} 10 \text{ to the upper portion,} \\ 10 \text{ to the shaft,} \\ 3 \text{ to the lower portion.} \end{array} \right.$$

The 10 Muscles attached to the Upper Portion are :

10	$\left\{ \begin{array}{l} \text{Gluteus Medius,} \\ \text{" Minimus,} \\ \text{Pyriformis,} \\ \text{Gemellus Superior,} \\ \text{Obturator Internus,} \\ \text{Gemellus Inferior,} \\ \text{Obturator Externus,} \\ \text{Quadratus Femoris.} \end{array} \right.$	to the Greater Trochanter.
		$\left\{ \begin{array}{l} \text{Iliacus,} \\ \text{Psoas Magnus,} \end{array} \right.$ to the Lesser Trochanter

The 10 Muscles attached to the Middle Portion of the Femur are :

2 Anteriorly: { Crureus,
Suberureus.

8 Posteriorly: { Vastus Externus—to the outer lip of the Linea Aspera.
Vastus Internus—to the inner lip of the Linea Aspera.
Pectineus,
Gluteus Maximus, } to the Interstice of the
Biceps Flexor Cruris, } Linea Aspera.
Adductor Magnus, }
“ Brevis, }
“ Longus, }

The 3 Muscles attached to the Lower End of the Femur are :

3 { Popliteus,
Gastrocnemius,
Plantaris.

The Femur is developed by 5 Centres of ossification.

1 for the Shaft	- -	1	} 5
1 “ each Extremity		2	
1 “ each Trochanter		2	

The Femur is the first of the long bones, except the Clavicle, to show traces of ossification, (5th week.)

Ossification in the lower end of the Femur begins at the end of the 9th month of foetal life. It is the first ossification in the Epiphyses of the Femur and the last one of them that unites with the Shaft (about the 20th year.)

As a general rule Epiphyses, which are situated in the direction of the Nutr. Artery of a bone appear last and ossify first with the shaft of the bone, and vice versa. An exception to this is the lower end of the Fibula, in which ossification appears first and which unites first with the shaft.

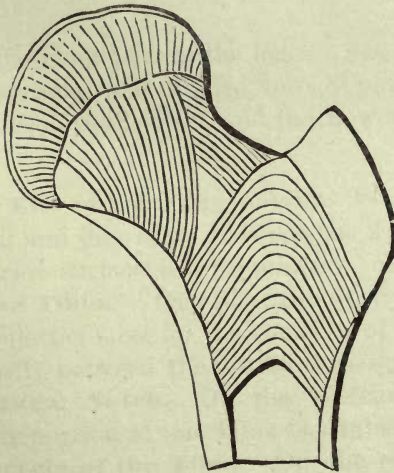
The direction of the Nutrient Foramen of the long bones in the extremities can easily be remembered in the following manner :

The Nutrient Foramen of the Humerus and Femur (parts of the extremities, which consist only of one bone.) run in the direction towards the Pelvis. The Nutrient foramina of the Radius, Ulna, Tibia and Fibula run in the opposite direction.

N. B.—**Epiphysis** is a portion of a bone that is developed by its own centre of ossification and **that has not joined** with the other portion of the bone by ossification.

Apophysis is the name of the same portion of a bone when it **has joined** the shaft of the bone by ossification.

The arrangement of the cancellated structures in the Upper End of the Femur is remarkable. It is in the form of a brace, and most admirably adapted to strengthen this part, which is so liable to fracture and to sustain concussion and pressure.



Section of Upper portion of the Femur.

The Patella belongs to the flat bones. It articulates with one bone, the **Femur**, and gives attachment to 4 Muscles:

$$4 \left\{ \begin{array}{l} \text{Rectus Femoris,} \\ \text{Crureus,} \\ \text{Vastus Internus,} \\ \text{“ Externus.} \end{array} \right.$$

The Patella presents for examination 2 surfaces—one, the external is rough and gives attachment to the foregoing muscles—the other, internal, is smooth, and articulates with the Trochlea of the Femur.

Fractures of the Patella are generally in a horizontal direction. The upper end of the Patella is in such a case drawn up by the contracted 4 Muscles, and the lower end is kept in its place by a strong ligament, the **Ligamentum Patellae**, which connects it with the tubercle of the Tibia.

Tibia forms the inner part of the leg.

It is a long bone, and divided into 3 portions: the Upper End, the Middle Part, and the Lower End.

The Upper End of the Tibia presents 2 tuberosities, an external and internal. Between the 2 tuberosities on the superior surface is a prominence, called “**the Spine of the Tibia.**” On either tuberosity superiorly is an articulating facet for the condyles of the Femur. Posteriorly between the 2 tuberosities is a notch, called: **Popliteal Notch.** On the anterior surface of the upper portion of the Tibia is a tuberosity, called: the **Tubercle of the Tibia.** On the external surface of the external tuberosity is a little facet for the articulation with the Fibula. On the internal surface of the internal tuberosity is a groove for the attachment of the Semimembranosus Muscle.

The Middle Portion of the Tibia is like a triangular pyramid, presenting 3 surfaces and 3 borders. **The anterior Border** is situated forwards, and is very **subcutaneous**, that means: it is only covered by integument, hence any pressure produces here considerable pain. **To the External Border** is attached the **Interosseus Membrane** (connecting with the Fibula). **On the Posterior Surface** is an **Oblique Line**, and a little below these the **Nutrient Foramen going downwards**. Above the oblique line is attached the **Popliteus Muscle**, below the **Flexor Longus Digitorum Muscle**.

The Nutrient Foramen in the Tibia is the largest of all the nutrient foramina of the bones in the body.

The Lower End of the Tibia is quadrilateral, presenting on its internal surface a depending process, called: **the Inner Malleolus** which gives attachment to the **Internal Lateral Ligament** of the Ankle. **On the Inferior Surface** is a smooth surface for articulation with the **Astragalus**. **On the Internal Surface** is a smooth surface for articulation with the **Fibula**. On the posterior surface we see several grooves, which lodge the tendons of the muscles, going to the foot.

The Tibia articulates with 3 bones, viz:

Femur,
Fibula,
Astragalus,

The Tibia gives attachment to 14 Muscles.

These may be divided into :

8 Muscles attached to the upper portion, and
6 “ “ “ shaft.

The 8 Muscles attached to the **upper portion** are :

- | | | | | | | | | |
|----------------|---|---|----------|---|---|----------|------------------|-------------|
| 8 { | 4 | Forming the Ligamentum Patellae, or
the Common Tendon of | | <table border="0"> <tr><td>Rectus Femoris.</td></tr> <tr><td>Crureus.</td></tr> <tr><td>Vastus Internus.</td></tr> <tr><td>“ Externus.</td></tr> </table> | Rectus Femoris. | Crureus. | Vastus Internus. | “ Externus. |
| | Rectus Femoris. | | | | | | | |
| | Crureus. | | | | | | | |
| | Vastus Internus. | | | | | | | |
| “ Externus. | | | | | | | | |
| 3 | <table border="0"> <tr><td>Sartorius</td></tr> <tr><td>Gracilis</td></tr> <tr><td>Semitendinosus</td></tr> </table> | Sartorius | Gracilis | Semitendinosus | Going to a point below the
Tubercle. | | | |
| Sartorius | | | | | | | | |
| Gracilis | | | | | | | | |
| Semitendinosus | | | | | | | | |
| 1 | Semimembranosus going to the internal side of the
Internal Tuberosity. | | | | | | | |

The 6 Muscles attached to the **Shaft** are :

- | | | | |
|------------|---------------------------|---|--------------|
| 6 { | Tibialis Anticus. | } | Anteriorly. |
| | Extensor Longus Digitorum | | |
| | Tibialis Posticus, | } | Posteriorly. |
| | Flexor Longus Digitorum, | | |
| | Soleus, | | |
| Popliteus, | | | |

The Tibia is developed by **3 centres of ossification**, viz :

- 1 for the Upper End,
- 1 for the Shaft,
- 1 for the Lower End.

The Fibula is a long bone, the longest in proportion to its thickness in the body.

The Upper End of the Fibula presents a facet for articulation with the Tibia and a process called: “**Styloid Process**,” to which are attached the Biceps Flexor Cruris Muscle, and the External Lateral Ligament of the Knee-joint.

The Middle Portion or Shaft of the Fibula is triangular, and presents 3 surfaces and 3 borders. To the inner border is attached the Interosseus Membrane.

The Lower End of the Fibula presents a facet for articulation with the Tibia and one for the articulation with the Astragalus.

On the external side most dependent is a process called :
the External Malleolus, which gives attachment to
the External Lateral Ligament of the Ankle-joint.

The Nutrient Foramen of the Fibula is about the middle
of the bone and is directed downwards towards the
Ankle-joint.

It articulates with 2 bones:

the Tibia, and
“ Astragalus.

and gives attachment to 9 Muscles.

These are :

9 {	Extensor Longus Digitorum,	}	3 To the Anterior Surface.
	Extensor Proprius Pollicis,		
	Peroneus Tertius,		
	Soleus,		
	Tibialis Posticus,	}	3 to the Posterior and in- ternal surface.
Flexor Longus Pollicis.			
}	Peroneus Longus,	}	2 to the External Surface.
	“ Brevis,		
	Biceps Flexor Cruris		1 to the Styloid process.

The Fibula is developed by **3 centres of ossification**,
1 for the Upper End,
1 for the Shaft,
1 for the Lower End.

N. B.—The Epiphysis of the Lower End, in which ossification
begins first, unites also first with the Shaft, contrary
to the general rule spoken of on page, No. 108.

The Foot consists of 26 bones, and is divided into 3 sections:

Tarsus,	7 bones.	}	26 bones.
Metatarsus,	5 “		
Digits or Toes	14 “		

The Tarsus is again divided into an **anterior portion** consisting of 5 bones, viz :

Scaphoid,
Cuboid,
External Cuneiform,
Middle “
Internal “ and

a **posterior portion** formed by 2 bones :

Os Calcis,
Astragalus.

Anterior Portion,

External to the
Mesial Plane of
the Body.

	Ex. Cun	Mid eifo	Int. rm.
	Cuboid	Scaphoid	
Os Calcis	Astragalus		

Internal to the
Mesial Plane of
the Body.

Posterior Portion.

Otherwise the Tarsus may be divided into an **external portion** consisting of

2 { Os Calois,
Cuboid, and

an **internal portion**, consisting of

{ Astragalus,
Scaphoid,
External } Cuneiform,
Middle }
Internal }

In this same way the whole foot may be divided into an **external portion**, consisting of 10 bones.

The human skeleton is divided into two parts: the *cranium* and the *trunk*.

The *cranium* is divided into the *brain case* and the *face*. The *brain case* is divided into the *skull* and the *base of the skull*. The *face* is divided into the *upper jaw* and the *lower jaw*.

Anterior View

Superior to the Mental Plane of the Body	Occipital Sphenoid	Frontal Ethmoid	Inferior to the Mental Plane of the Body
	Mandible	Mandible	

Posterior View

Otherwise the Trunk may be divided into an *external* portion consisting of

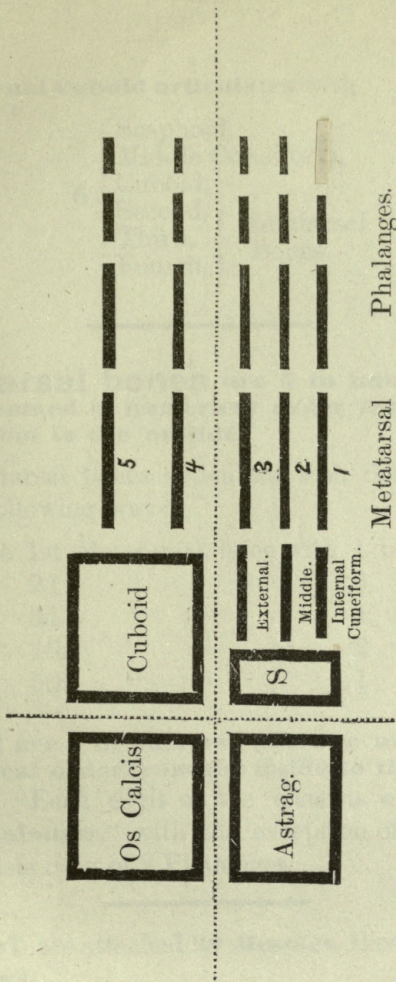
1. The *skull*, and

an *internal* portion consisting of

1. The *skull*,
2. The *base of the skull*,
3. The *vertebrae*,
4. The *ribs*,
5. The *sternum*,
6. The *pelvis*,
7. The *hips*,
8. The *thighs*,
9. The *legs*,
10. The *feet*.

In this sense the whole may be divided into an *external* portion consisting of 10 bones.

External portion of the Foot, 10 bones.



Internal portion of the Foot, 16 bones.

and an internal portion, consisting of 16 bones.

Each of these Tarsal bones articulates with 4 bones, except the Os Calcis with 2, and the External Cuneiform with 6 bones.

* The **Os Calcis** articulates with

2 { Astragalus,
Cuboid.

The **External Cuboid** articulates with

$$6 \left\{ \begin{array}{l} \text{Scaphoid,} \\ \text{Middle Cuneiform,} \\ \text{Cuboid,} \\ \text{Second,} \\ \text{Third,} \\ \text{Fourth,} \end{array} \right\} \begin{array}{l} \text{Metatarsal} \\ \text{Bones.} \end{array}$$

The Metatarsal bones are 5 in number, and these are named in numerical order from the inside of the foot to the outside.

The Metatarsal bones articulate with the Tarsal bones in the following way :

The 1st Metatarsal bone with 1 bone.

"	2d	"	"	3	"
"	3d	"	"	1	"
"	4th	"	"	2	"
"	5th	"	"	1	"

The Digits are 5 in number, and are numerated in numerical order from the inside to the outside of the foot. Each digit or toe consists of 3 bones, called "**Phalanges.**" with the exception of the First, which consists only of 2 Phalanges.

To the Foot are attached **20 Muscles**, these are arranged as follows :

$$20 \left\{ \begin{array}{l} \text{1 to the Dorsal surface,} \\ \text{Extensor Brevis Digitorum,} \\ \text{19 to the Plantar surface.} \end{array} \right.$$

these are again divided into **4 layers**, counted from the integument to the bones :

The 1st layer, 3 Muscles :

$$3 \left\{ \begin{array}{l} \text{Abductor Pollicis.} \\ \text{Flexor Brevis Digitorum.} \\ \text{Abductor Minimi Digiti.} \end{array} \right.$$

The 2d layer, 5 Muscles :

$$5 \left\{ \begin{array}{l} \text{Flexor Accessorius,} \\ \text{and} \\ \text{4 Lumbricales.} \end{array} \right.$$

The 3d layer, 4 Muscles:

- 4 { Flexor Brevis Pollicis.
Adductor Pollicis.
Transversus Pedis.
Flexor Minimi Digiti.

The 4th layer consists of 7 Interossei:

- 7 { 4 Dorsal, and | counted from the Tibia
3 Plantar, | to the Fibula.

In the Lower Extremity the surfaces of Flexion and Extension are alternately on the anterior and posterior surfaces of the limb. Hence it follows, that when a muscle of the Lower Extremity passes over 2 of the 4 principal joints it acts as a Flexor to one and as an Extensor to the other.

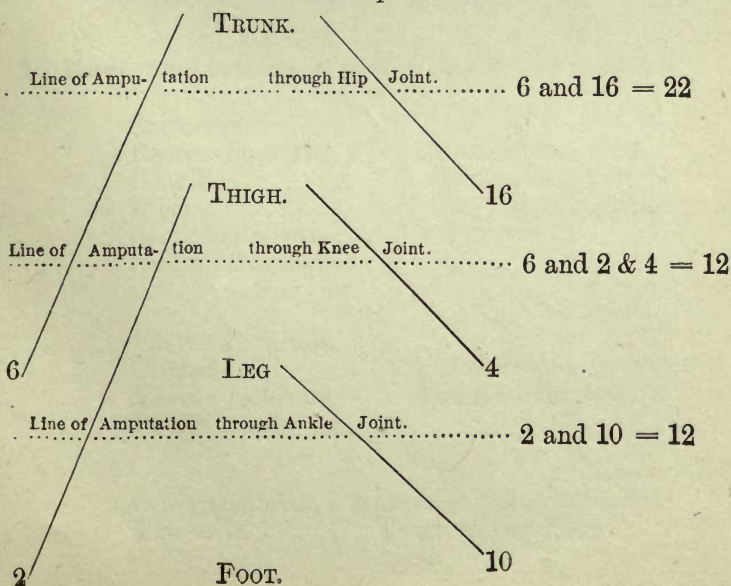
Exception to this rule form the Sartorius and Gracilis.

The 4 principal joints of the Lower Extremity are:

Hip, Knee, Ankle and Metatarsal Phalangeal joints.

		FLEXION.	EXTENSION.
At the Hip Joint	- - -	forwards	backwards
" Knee	- - -	backwards	forwards
" Ankle	- - -	forwards	backwards
" Metatarsal Phalangeal		backwards	forwards

Table showing the number of Muscles which have to be divided in different amputations:



We have to divide in Hip Amputation, 6 and 16=22 muscles :

These are :

Psoas Magnus.

Pyriformis, Gemellus Superior, Obturator Internus, Gemellus Inferior, Obturator Externus, Quadratus Femoris,	}	External Set of the Os Innominatum 6 muscles.
---	---	---

Tensor Vaginae Femoris, Gluteus Maximus, Gluteus Medius, Gluteus Minimus, Iliacus, Pectineus, Adductor Longus, Adductor Brevis, Adductor Magnus, Rectus Femoris, Sartorius, Gracilis, Biceps Flexor Cruris, Semitendinosus, Semimenbranosus,	}	Descending Set of the Os Innominatum 15 muscles.
--	---	--

In Knee Amputation, 6 and 4 and 2=12 muscles.

Sartorius, Rectus Femoris, Gracilis. Biceps, Semitendinosus, Semimembranosus,	}	Crural Group of the Descending Set of Os Inuominatum, 6 muscles.
--	---	---

Vastus Externus, Crureus, Vastus Internus, Popliteus,	}	4 muscles going from the Thigh to the Leg.
--	---	---

Gastrocnemius, Plantaris,	}	2 muscles going from the Thigh to the Foot.
------------------------------	---	--

In Ankle Amputation we have to divide 2 and 10=12 muscles.

Gastrocnemius, } 2 muscles going from the
Plantaris, } Thigh to the Foot.

Tibialis Anticus, Extensor Proprius Pollicis, Extensor Longus Digitorum, Soleus, Tibialis Posticus, Flexor Longus Pollicis, Flexor Longus Digitorum, Peroneus Longus, Peroneus Brevis, Peroneus Tertius,	}	10 muscles going from the Leg to the Foot.
---	---	--

There are 4 main amputations of the foot :

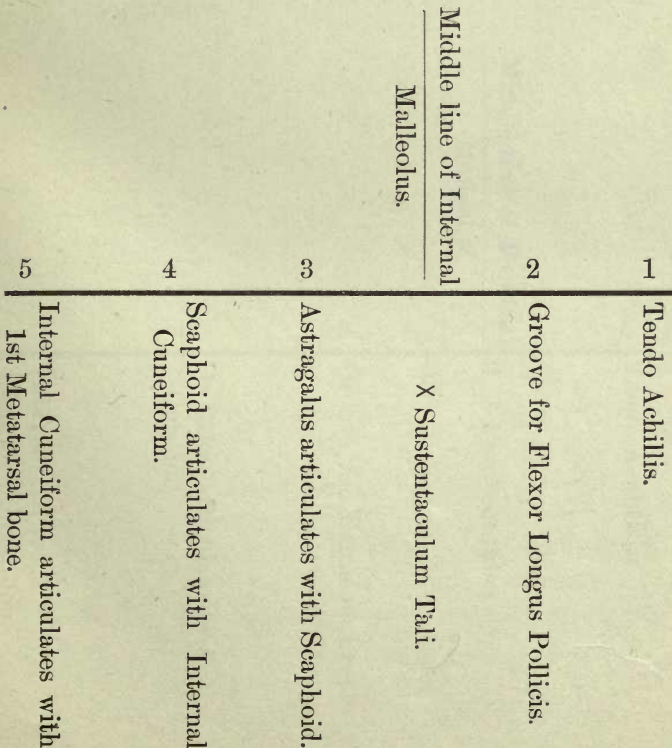
- 1) **Hey's operation**, in this the Toes and Metatarsal bones are removed.
- 2) **Chopart's operation**, in this the whole foot, except the Os Calcis and Astragalus is removed.
- 3) **Pirogoff's operation**, in this the whole foot except the posterior portion of the Os Calcis is removed
- 4) **Seyme's operation**, in this the whole foot is removed. The incision is made between the Tibia, Fibula and Astragalus.

B. The Gastrocnemius and Soleus muscles form a common tendon, which is called "**Tendo-Achillis**," and which is attached to the posterior portion of the Os Calcis. Sometimes the Plantaris muscle unites with the Tendo-Achillis.

The prominent processes of the 2 lateral sides of the Tarsus are important, as they are guiding points for the different operations on the foot.

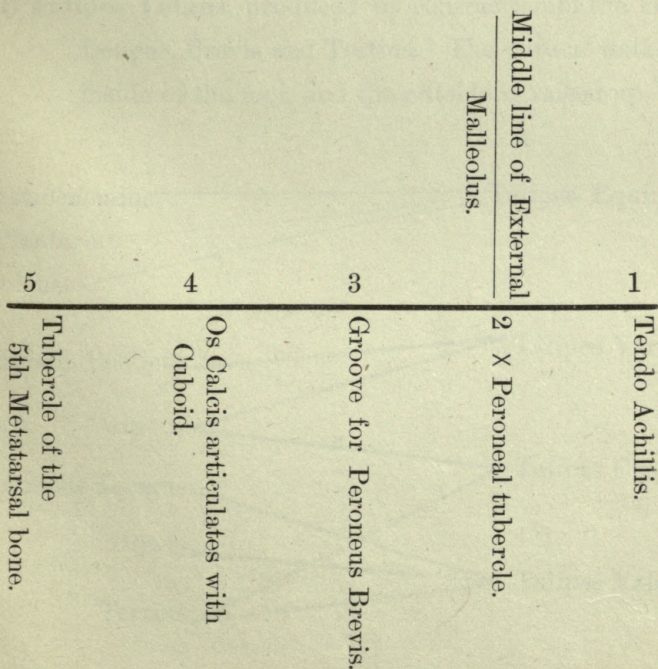
On the inside of the Tarsus we have

- 1) Posterior portion of the Os Calcis with the Tendo Achillis.
- 2) Behind and below the Internal Malleolus is a groove with the tendon of the Flexor Longus Pollicis.
- 3) About one inch anteriorly to the middle of the Internal Malleolus, the head of the Astragalus articulates with the Scaphoid. A little groove marks this place which is one of the endpoints of the line of division in Chopart's Operation.
- 4) About 3-4 of an inch in front of the named groove ends the Scaphoid and the Internal Cuneiform begins.
- 5) About one inch in front of this articulation is a little groove indicating the articulation of the Internal Cuneiform, with the 1st Metatarsal bone. This groove is one of the endpoints in the line of division in Hey's Operation.



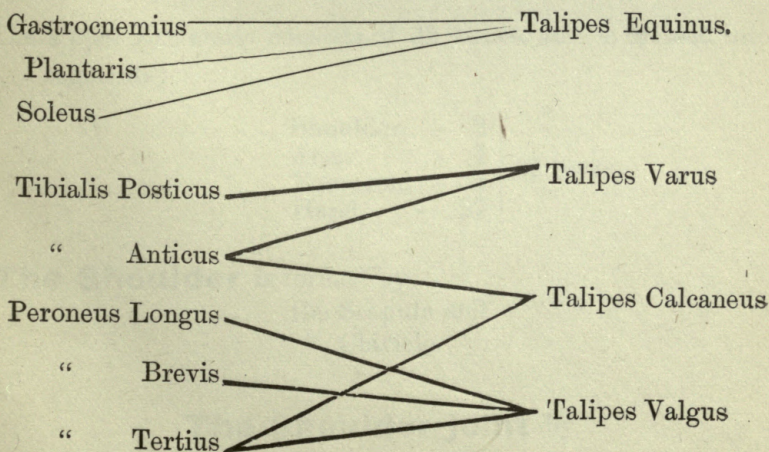
On the external side of the Foot we notice:

- 1) Posterior portion of Os Calcis with Tendo Achillis.
- 2) In the median line of the External Malleolus, a protuberance named: Peroneal tubercle.
- 3) In front of this is a groove for the Peroneus Brevis (The Peroneus Longus is posteriorly).
- 4) About one inch in front of the median line of the External Malleolus is a groove indicating the articulation of the Os Calcis and Cuboid (one of the endpoints of the line in division of Choparts operation).
- 5) About 1-2 inch from this groove is the Tubercle of the 5th Metatarsal bone. This Tubercle is one of the endpoints of the line in division in Hey's operation.



There are 4 principal kinds of Talipes or Clubfoot:

- 1) **Talipes Equinus**, produced by contraction of the Gastrocnemius, Soleus and Plantaris. The patient walks like a horse on its toes, and the heel is raised up.
- 2) **Talipes Calcaneus**, produced by contraction of the Tibialis Anticus and Peroneus Tertius. The patient walks on his heel, and the toes are raised up.
- 3) **Talipes Varus**, produced by contraction of the Tibialis Anticus and Tibialis Posticus Muscles. The patient walks on the outside of his foot. The inside is raised up.
- 4) **Talipes Valgus**, produced by contraction of the Peroneus Longus, Brevis and Tertius. The patient walks on the inside of the foot, and the outside is raised up.



are the 4 principal kinds of Talipes or

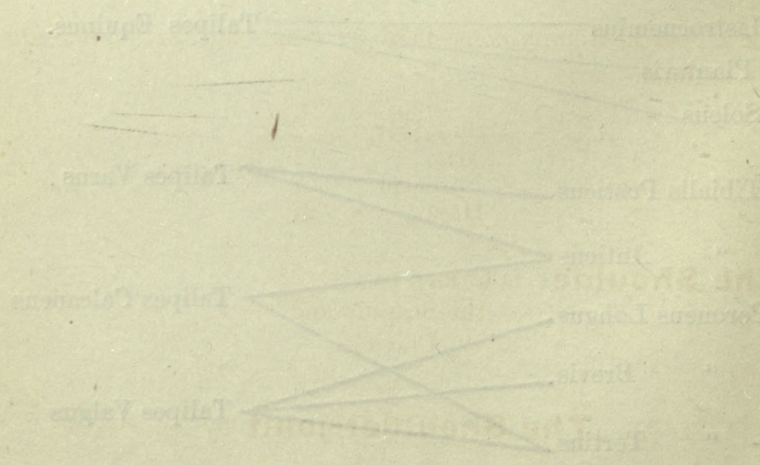
Clubfoot:

1. Talipes Equinus, produced by contraction of the Gluteus maximus, Psoas and Iliacus. The patient walks on his toes and the heel is raised up.

2. Talipes Valgus, produced by contraction of the Tibialis Anterior and Peroneus Tertius. The patient walks on his heel and the toes are raised up.

3. Talipes Varus, produced by contraction of the Tibialis Anterior and Tibialis Posterior Muscles. The patient walks on the inside of his foot. The inside is raised up.

4. Talipes Extremus, produced by contraction of the Peroneus Tertius and Tibialis. The patient walks on the outside of the foot and the inside is raised up.



The Extensors of the Leg are :

the Rectus Femoris,	} sometimes called the :
“ Crureus,	
“ Vastus Externus,	
“ “ Internus,	
	Quadriceps Extensor Cruris
	Muscle.

The extensors are supplied by **branches of the Anterior Crural Nerve.**

The Flexors of the Leg are :

the Biceps Flexor Cruris,
 “ Semitendinosus,
 “ Semimembranosus,
 Popliteus.

These are supplied by branches of the **Great Sacro-Sciatic Nerve.**

UPPER EXTREMITY.

The Upper Extremity consists of 32 bones, and is divided into 4 segments :

Shoulder,	-	2	} 32 bones.
Arm,	-	1	
Forearm,	-	2	
Hand,	-	27	

The Shoulder is formed by :
 the Scapula and
 “ Clavicle.

The Shoulder-joint by
 the Scapula and
 “ Humerus.

The Extensors of the Leg

The muscles called the
the Extensors of the Leg
are situated in the
posterior part of the
leg.

The extensors are supplied by branches of the
Sural Nerve.

The Flexors of the Leg

The muscles called the
the Flexors of the Leg
are situated in the
anterior part of the
leg.

These are supplied by branches of the
Sural Nerve.

UPPER EXTREMITY.

The Upper Extremity consists of 32 bones and is divided into 4
segments:

Shoulder	-	2
Arm	-	1
Forearm	-	2
Hand	-	27
32 bones		

The Shoulder is formed by:
the Scapula and
Clavicle.

The Shoulder-joint is

formed by the
Humerus.

The Scapula articulates with 2 bones :

the Clavicle and

“ Humerus :

and gives attachment to 16 muscles. It is a flat bone, and presents for examination :

2 surfaces, the Dorsal or posterior, and the Costal or anterior ;

3 processes, the Spinous, the Acromion, and the Coracoid ;

3 borders, the Superior or Cervical, the Axillary, and the Posterior or Vertebral ;

3 angles, the Anterior, Posterior and Inferior ;

The Anterior angle is called : “ **the Head of the Scapula**,”

It presents a shallow concavity, termed **Glenoid Fossa**, which articulates with the Head of the Humerus. Around the Head is a constriction, which forms the **Neck of the Scapula**.

On the Superior Border we see a notch, called : **the Supra-Scapular Notch**,” which is transformed into a Foramen by a small ligament “ **the Transverse Ligament**.” Through this Supra Scapular Foramen passes the Supra Scapular Nerve, and above the Transverse Ligament passes the Supra Scapular Artery.

The Costal surface is concave, and presents several sharp long ridges, which serve for the attachment of the Subscapularis muscle.

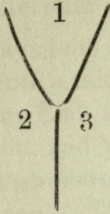
The Dorsal surface is convex and smooth, and is divided by the Spinous Process into the **Supraspinous Fossa**, giving attachment to the Supraspinatus muscle, and the **Infraspinous Fossa**, which gives attachment to the Infraspinatus muscle.

The Coracoid Process gives attachment to 6 Ligaments :

- | | | | |
|----|---|----------------|------------|
| 1) | Costo-Coracoid Ligament, | going inwards. | |
| 2) | Coraco-Acromial | “ “ | outwards. |
| 3) | Coraco-Humeral | “ “ | downwards. |
| 4) | 2 Coraco-Clavicular Ligaments, going upwards, | | |
| 5) | | | |
| 6) | Transverse Ligament. | | |
- Conoid
Trapezoid.

|

Section of Scapula :



Angles of Scapula :

$$1) \quad 98\frac{1}{2}^{\circ}$$

$$2) \quad 129\frac{1}{4}^{\circ}$$

$$3) \quad 132\frac{1}{2}^{\circ}$$

$$360^{\circ}$$

The Scapula is developed by 7 centres of ossification :

- 1—For the Body.
- 2— “ “ Coracoid Process.
- 2— “ “ Acromion “
- 1— “ “ Posterior border.
- 1— “ “ Inferior angle.

The Scapula gives attachment to 16 Muscles, which are divided into :

5 muscles attached to the surfaces :

Subscapularis to the Costal surface :

Supraspinatus, }
Infraspinatus, } to the Dorsal surface.
Teres Major, }
“ Minor, }

5 muscles attached to the processes :

Trapezius, } to the Spinous and Acromion process.
Deltoid, }

Pectoralis Minor, }
Coraco-Brachialis, } to the Coracoid Process.
Short head of the Biceps. }

5 muscles attached to the borders :

Omo-Hyoid to the superior border.

Rhomboideus Minor, } to the
“ Major, } vertebral
Serratus Magnus, } border.

Triceps Extensor Cubiti, to the axillary border.

1 muscle attached to the posterior angle :

Levator Anguli Scapulae.

The Clavicle or collar bone belongs to the long bones. It articulates with 2 sometimes 3 bones, viz: Scapula, Sternum and sometimes the first rib.

The Clavicle is of a double curve, like the letter S: it presents a middle portion and two extremities, the Scapular End and the Sternal End. The Scapular End is flat, and presents on its posterior border the **Conoid Tubercle** which gives attachment to the Conoid Ligament. The Sternal End is triangular and has an articular facet for the articulation with the Sternum.

The bone is in surgical respect divided in **3 portions**; the external, the middle and the internal 3d. Where the external and middle 3d join together is the Tubercle of the Clavicle, and this is the weakest point of the bone, where fractures most frequently happen.

The Clavicle is very elastic on account of its curves. It is **developed by 2 centres of ossification**:

1 for the Shaft (**the earliest of all the bones in the body.**)

1 “ “ Sternal extremity.

The Clavicle gives attachment to 6 muscles:

Pectoralis Major, } to the anterior border.
Deltoid,

Sterno-Cleido-Mastoid, } to the posterior border.
Trapezius,

Subclavius, to the inferior surface.

Sterno-Hyoid to the posterior surface.

The **Arm** is formed by one bone:

The Humerus, or Os Brachii.

The Humerus belongs to the long bones. It articulates with 3 bones:

Scapula,
Ulna,
Radius.

The bone is divided **into 3 portions**, the Upper End, or upper fourth, the middle portion or Shaft, and lower fourth or Lower End.

The Upper End of the Humerus presents for examination a Head, an Anatomical Neck, a Greater and a Lesser Tuberosity, a Bicipital Groove and a Surgical Neck. The Head of the Humerus is round and a little less than half a globe, it has no depression like the Head of the Femur. The Anatomical Neck is a constricted portion below the Head. The Greater Tuberosity gives attachment to 3 muscles, the Lesser Tuberosity to 1 muscle. Between the 2 Tuberosities is the Bicipital Groove giving attachment to 3 muscles.

The middle portion or Shaft of the Humerus appears twisted around itself. The upper part is triangular. The lower portion cylindrical. By the twisting of these 2 parts a groove is formed, called: **the Musculo-Spiral Groove** for the Musculo-Spiral Nerve and Superior Profunda Artery.

About the middle of the Shaft is **the Nutrient Foramen** for the Nutrient Artery. **The direction of this Foramen is downwards towards the Elbow-joint.**

The Lower End of the Humerus is more flat and triangular. It has an internal and an external Condyle. The portion of the lower surface, which articulates with the Ulna, is called: **Trochlea**, that portion which articulates with the Radius, **Radial Head**. Anteriorly are 2 depressions on the lower end—one for the Coronoid process of the Ulna, and the other for the Head of the Radius. Posteriorly is a deeper depression for the Olecranon process of the Ulna.

The Humerus is developed by 7 centres of ossification:

- 1 for the Shaft,
- 1 “ Head,
- 1 “ Greater Tuberosity,
- 1 “ Radial Head,
- 1 “ Trochlea,
- 1 “ Inner Condyle,
- 1 “ Outer Condyle.

The 25 Muscles attached to the Humerus are divided into :

7	to the Upper End,	} in all 25 muscles.
5	" Shaft, and	
13	" Lower End,	

1) To the Upper End:

7 {	Supraspinatus,	} attached to the Greater Tuberosity.
	Infraspinatus,	
	Teres Minor,	
	Subscapularis to the Lesser Tuberosity.	} to the Bicipital Groove.
	Teres Major,	
Latissimus Dorsi,		
	Pectoralis Major.	

2) To the Shaft:

5 {	Deltoid,
	Coraco-Brachialis,
	Brachialis Anticus,
	Triceps Extensor Cubiti,
	Subanconeus.

3) To the Lower End 13 muscles: these are divided into
5 muscles to the Inner Condyle.

8	"	"	Outer	"
<hr/>				
13 muscles.				

To the Inner Condyle:

5 {	Pronator Radii Teres,	} the superficial Pronators and Flexors.
	Flexor Carpi Radialis,	
	Palmaris Longus,	
	Flexor Sublimis Digitorum,	
	Flexor Carpi Ulnaris,	

To the Outer Condyle:

8 {	Supinator Longus,	} the superficial Supinators and Extensors.
	Extensor Carpi Radialis Longior,	
	" " " Brevior,	
	" Communis Digitorum,	
	" Minimi Digiti,	
	" Carpi Ulnaris,	
	Anconeus,	
	Supinator Brevis,	

The Ulna is a long bone, situated on the internal side of the Forearm, or the Little Finger's side. It articulates with 2 bones: Humerus and Radius, and it gives attachment to 14 muscles.

The Ulna does not form any part of the Wrist-joint. It is separated from it by the Triangular Fibro Cartilage. The Ulna is divided **into 3 portions**, the Upper End, the middle portion and the Lower End.

On the Upper End we see : 2 processes,

the Olecranon Process, and
the Coronoid Proces; and

2 cavities : the Greater Sigmoid cavity for the articulation with the Trochlea of the Humerus, and the lesser Sigmoid cavity for the articulation with the Radius.

The middle portion or Shaft of the Ulna is triangular and pyramidal in shape becoming thinner to its lower end.

It presents 3 borders and 3 surfaces. To the external border is attached the Interosseus Membrane, which does not strengthen the bones but gives space for the attachment of muscles.

The Nutrient Foramen is going in the direction upwards to the Elbow-joint, See general rule, page No. 108.

The Lower End of the Ulna is round, cylindrical and ends into a pointed process, called : **the Styloid process.**

The muscles attached to the Ulna are **13 sometimes 14.** These are divided into :

3 To the Olecranon Process :

2 { Triceps Extensor Cubiti,
Anconeus,
Flexor Carpi Ulnaris.

3 To the Coronoid process :

3 { Brachialis Anticus,
Pronator Radii Teres,
Flexor Sublimis Digitorum.

The Union is a body situated on the internal side of the
forearm of the hand. It is situated with
2 bones: humerus and radius, and it gives attach-
ment to 14 muscles.

The first bone now forms part of the skeleton.
It is separated from it by the interosseous ligament.
The bone is divided into 2 portions, the
proximal and the distal, the middle portion being the
shaft.

In the upper end we see 2 processes:
the olecranon process and
the coronoid process, and
2 tubercles: the greater tubercle for the insertion
of the biceps of the humerus, and the lesser
tubercle for the insertion of the coracobrachialis.

The middle portion or shaft of the bone is triangular
and flattened in shape, becoming thinner to the distal
end.

At the distal end we see 2 tubercles. To the external
one is attached the latissimus dorsi muscle, which does not
insert into the bone but gives support to the olecranon.
To the internal one is attached the anconeus muscle.

The distal end of the bone is seen in the flexion of the
arm. The olecranon is the point of the elbow, and it gives
support to the head of the ulna, and is attached to the
ulna by the olecranon ligament, which is the strongest of the
ligaments of the elbow.

The radius is attached to the ulna and is separated from
it by the interosseous ligament.

At the distal end of the radius we see
2 processes: the styloid process and
the base of the 5th metacarpal.

To the styloid process is attached
the ligament of the wrist.
The base of the 5th metacarpal is
attached to the base of the 1st metacarpal.

2 To the interior surface ;

2 { Flexor Profundus Digitorum,
Pronator Quadratus.

5 To the posterior surface :

5 { Extensor Carpi Ulnaris,
Supinator Brevis,
Extensor Ossis Metacarpi Pollicis,
“ Secundi Internodii “
“ Indicis.

Radius belongs to the long bones. It is situated on the outside of the Forearm, and articulates with 4 bones, viz :

Humerus,
Ulna,
Scaphoid,
Semilunar.

The Radius is divided into 3 portions, Upper End, middle portion or Shaft and Lower End.

The Upper End presents : a Head, a Neck and a Tuberosity.

The Head is round and articulates by its superior portion with the Humerus and laterally with the Lesser Sigmoid cavity of the Ulna.

The Neck is surrounded in the natural state by the Orbicular Ligament.

The Tuberosity gives attachment to the Biceps Flexor Cubiti muscle.

The Middle Portion is triangular and presents 3 surfaces and 3 borders. To the internal border is attached the Interosseus Membrane. About the centre is the Nutrient Foramen, going upwards towards the Elbow-joint.

The Lower End in quadrilateral, and articulates on its inferior surface with the Scaphoid and Similunar bones, and on its interior surface with the Ulna.

The Radius gives attachment to 9 muscles, viz :

To the outer surface 4 muscles.	{	Pronator Radii Teres, Pronator Quadratus, Supinator Longus, Supinator Brevis.
------------------------------------	---	--

To the anterior surface 2 muscul.	{	Flexor Sublimis Digitorum, Flexor Longus Pollicis.
-----------------------------------	---	---

To the posterior surface 3 muscul.	{	Extensor Ossis Metacapi Pollicis, Extensor Primi Internodii Pollicis.
------------------------------------	---	--

To the Tuberosity 1 muscle :
Biceps Flexor Cubiti.

The Hand consists of 27 bones, these are divided into :

Carpus,	8 bones,	{	27
Metacarpus,	5 "		
5 Fingers,	14 "		

The Carpus consists of 8 bones, which are situated in 2 parallel rows, called : the **Proximal row**, which is situated nearest to the body, and the **distal row**, which is farthest from the body.

The 4 carpal bones in the proximal row are : (going from the Thumb or external side to the Little Finger.)

Scaphoid,	articulating with 5 bones.		
Semilunar,	"	"	5 "
Cuneiform,	"	"	3 "
Pisiform,	"	"	1 "

The 4 carpal bones in the distal row are :

Trapezium,	articulating with 4 bones.		
Trapezoid,	"	"	4 "
Os Magnum,	"	"	7 "
Unciform,	"	"	5 "

The Metacarpal bones are 5 in number, named in numerical order from the radial or external side to the internal side. They articulate with the carpal bones in the following way :

1st Metacarpal bone with 1 bone.

2d " " " 3 "

3d " " " 1 "

4th " " " 2 "

5th " " " 1 "

The articulations of the Carpal Bones may be easily remembered by constructing the following figure :

1st) Make a W (**S M L U C**) and a dot—**P** to the right side.

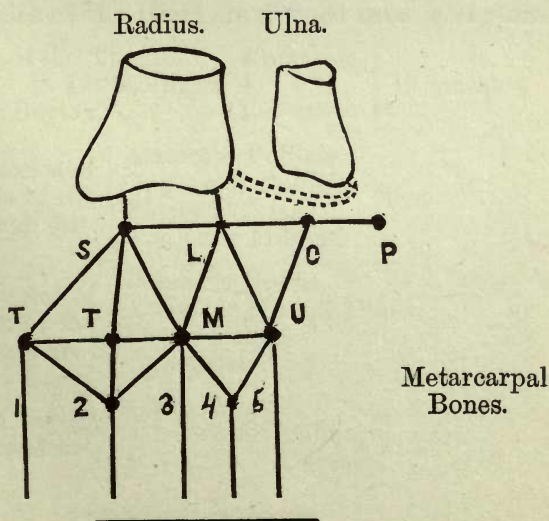
2d) Make an inverted V (**T S T**) to the left.

3d) Combine the 4 points above and the 4 points below.

4th) Mark the situation of the Radius and combine the points **S** and **L** with it.

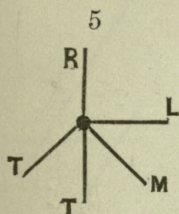
5th) Make a W (**T 2 M 4 U**) and draw the lines for the metacarpal bones 1, 2, 3, 4, 5.

The points $\begin{Bmatrix} \text{S L C P} \\ \text{T T M U} \end{Bmatrix}$ stand for the 8 metacarpal bones and the connecting lines indicate exactly the articulation of these one with the other. In the same way the figure shows the articulation of the Metacarpal bones 1, 2, 3, 4, 5

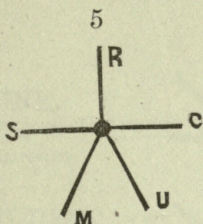


The articulations of each Metacarpal Bone may be easily studied on the following diagrams :

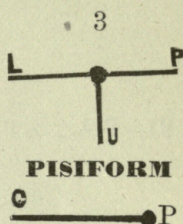
SCAPHOID.



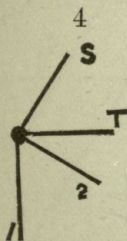
LUNAR.



CUNEIFORM.

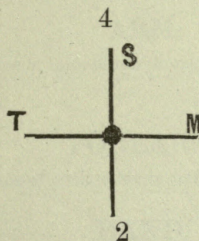


TRAPEZIUM.



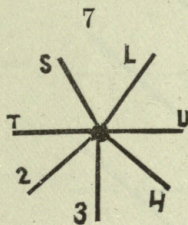
Metacarpal.

TRAPEZOID.



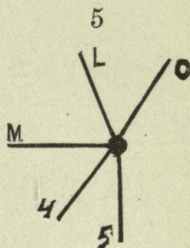
Metacarpal.

MAGNUM.



Metacarpal.

UNCIFORM.



Metacarpal.

To the Hand are attached **19 muscles**; and on it act in all 38 muscles.

The 19 muscles of the Hand are divided **into 3 regions**:

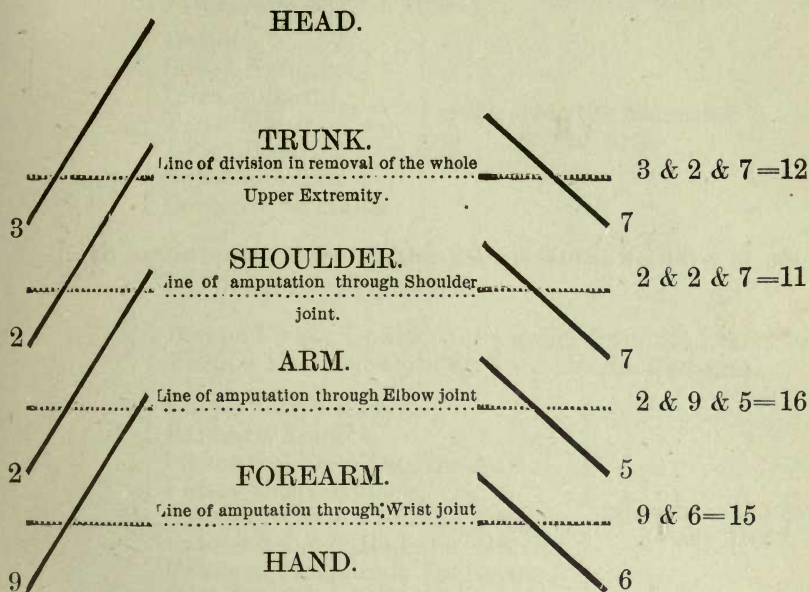
- | | | |
|-------------------------|------------|---------------|
| 1) Region of the Thumb, | 4 muscles, | } 19 muscles. |
| 2) " " Little Finger, | 4 " " | |
| 2) Palmar Region, | 11 " " | |

The muscles of the region of the Thumb are: { Abductor Pollicis,
Opponens Pollicis,
Flexor Brevis,
Adductor Pollicis.

The muscles of the region of the Little Finger are: { Palmaris Brevis,
Abductor Minimi Digiti,
Flexor Brevis " "
Opponens " "

Palmar region { 4 Lumbricales,
11 muscles, { 3 Interossei Palmaris,
4 " Dorsalis.

Muscles which are divided in the different amputations of the Upper Extremity.



In case the **whole Upper Extremity is to be removed** from the Trunk, we have to divide 3 and 2 and 7 = 12 muscles

3 { Sterno-Cleido-Mastoid, } going from the Head
 { Sterno-Hyoid, } to the Shoulder.
 { Omo-Hyoid, }

2 { Pectoralis Major, } going from the Trunk
 { Latissimus Dorsi, } to the Shoulder.

7 { Subclavius,
 Pectoralis Minor,
 Serratus Magnus,
 Trapezius,
 Levator Anguli Scapulae
 Rhomboideus Minor,
 Rhomboideus Major, } going from the Trunk
 to the Shoulder.

In Amputation through the Shoulder-Joint we have to divide 2 and 2 and 7 = 11 Muscles.

2 { Pectoralis Major, } going from the Trunk
 { Latissimus Dorsi, } to the Arm.

2 { Biceps Flexor Cubiti, } going from the Shoulder
 { Triceps Extensor Cubiti, } to the Forearm.

7 { Deltoid,
 Supra-Spinatus,
 Infra-Spinatus,
 Teres Minor,
 Teres Major,
 Subscapularis,
 Coraco-Brachialis, } going from the Shoulder
 to the Arm.

In amputation through the Elbow-Joint we have to cut 2
 and 9 and 5=16 muscles.

2 { Biceps Flexor Cubiti, } going from the Shoulder
 { Triceps Extensor Cubiti, } to the Forearm.

9 { Flexor Carpi Radialis,
 Palmaris Longus,
 Flexor Sublimis Digitorum,
 Flexor Carpi Ulnaris,
 Extensor Carpi Radialis Longior,
 Extensor Carpi Radialis Brevior,
 Extensor Communis Digitorum,
 Extensor Minimi Digiti,
 Extensor Carpi Ulnaris. } going from the Arm
 to the Head.

5 { Brachialis Anticus,
 Pronator Teres,
 Anconeus,
 Supinator Longus,
 Supinator Brevis, } going from the Arm
 to the Forearm.

In amputation through the Wrist-Joint we have to cut 9
 and 6=15 muscles.

9 { Flexor Carpi Radialis,
 Palmaris Longus,
 Flexor Sublimis Digitorum,
 Flexor Carpi Ulnaris,
 Extensor Carpi Radialis Longior,
 Extensor Carpi Radialis Brevior,
 Extensor Communis Digitorum,
 Extensor Minimi Digiti,
 Extensor Carpi Ulnaris, } going from the Arm
 to the Hand.

6 { Flexor Longus Pollicis,
 Flexor Profundus Digitorum,
 Extensor Ossis Metacarpi Pollicis,
 Extensor Primi Internodii Pollicis,
 Extensor Secundi Internodii Pollicis,
 Extensor Indicis, } going from
 the Forearm
 to the Hand.

The Flexors of the Forearm are 2 in number, viz :

Biceps Flexor Cubiti, } supplied by the Musculo-
Brachialis Anticus, } Cutaneous Nerve.

The Extensors of the Forearm are 2 in number :

Triceps Extensor Cubiti, } supplied by the Musculo-
Anconeus, } Spiral Nerve.

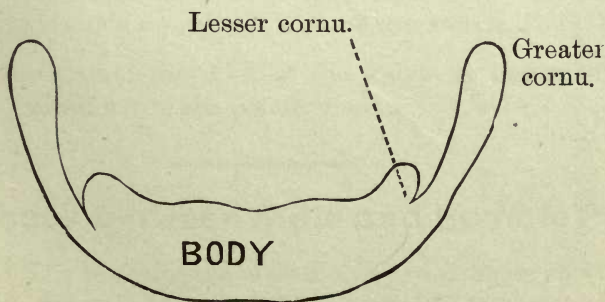
Hyoid Arch consists of one bone, the Hyoid bone or Os Hyoides, which gives attachment to 11 pairs of muscles :

3 { Sterno-Hyoid, }
 { Omo-Hyoid, } coming from below.
 { Thyro-Hyoid, }

6 { Digastricus, }
 { Mylo-Hyoid, }
 { Genio-Hyoid, } coming from above.
 { Genio-Hyo-Glossus, }
 { Hyo-Glossus, }
 { Lingual, }

2 { Stylo-Hyoid, }
 { Middle constrictor of the Pharynx, } laterally.

The Hyoid bone supports the tongue, hence called : **Lingual bone**. It is a bony arch in the shape of a horseshoe, and consists of a Body, 2 Greater Cornua, and 2 Lesser Cornua.

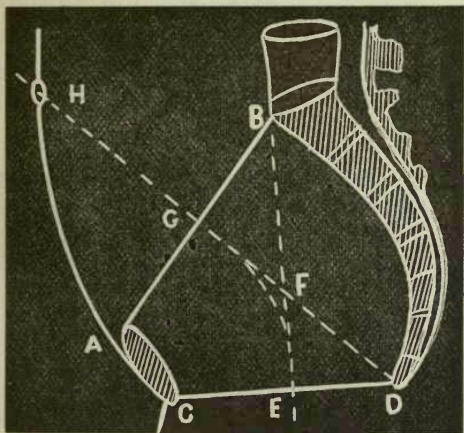


Pelvis in General.

The normal position of the Pelvis in the erect posture is oblique to the Trunk of the body. (**The Cotyloid Notch of the Acetabulum looking downwards.**)

A plane laid through the superior border of the Symphysis Pubis, Ilio-Pectineal line, and Promontory of the Sacrum, is called: **the Inlet or Superior Strait.** (A. B.)

A plane laid through the inferior border of the Symphysis Pubis, Tuberosities of the Ischia and Coccyx, is called: **the Outlet or Inferior Strait.** (C. D.)



The Axis of the Inlet, (A. B.) is a line drawn perpendicular to the plane of the inlet, in the middle of the transverse diameter. This Axis (H. D.) goes above the plane in a normal built person to the Umbilicus, below the plane it will reach the Coccyx.

The Axis of the Outlet is a line drawn perpendicular to the plane of the Outlet in the middle of the transverse diameter. This line (B. E.) will go above the plane to the Promontory of the Sacrum, below the plane it will fall between the feet of the person. These 2 axes meet each other under an obtuse angle. By rounding off this angle we get the **Axis of the Pelvis, E. G. H.**

The direction of the Axis of the Pelvis is important in all operations on the pelvic viscera.

Differences between Male and Female Pelvis

- 1) The bones of the male Pelvis are stronger and thicker than the female. The points of attachment for the muscles are more prominent.

- 2) The cavity of the true Pelvis in the male is deeper and narrower than in the female.
 - 3) The Obturator Foramen is in the male Pelvis of a larger size and more triangular.
 - 4) In the male Pelvis the antero-posterior diameter of the Inlet is the longest, in the female the transverse.
 - 5) The Sacrum in the female is more straight than the male
 - 6) The Arch of the Pubes is in the male more sharp and angular than in the female.
 - 7) The Tuberosities of the Ischia incline in the male Pelvis more closely together than in the female.
-

ARTHROLOGY or SYNDESMOLOGY.

The structures which enter into the formation of a joint are :

- | | | |
|----------|--|---|
| Joint: { | 1) Bones (articular lamella). | |
| | 2) Cartilage , { temporary, { articular, costal, and
{ permanent, { membranous form. | |
| | 3) Fibro-
Cartilage ,
4 kinds: { | Circumferential (they serve to deepen cavities as Cotyloid Ligament of the Hip-joint).
Connecting (found in symphyses of the pelvis).
Intra-articular (found
in: { Temporo-Maxillary ,
Sterno-Clavicular ,
Acromo-Clavicular ,
Wrist and Knee-joints).
Stratiform (lining the osseous grooves through which tendons glide). |
| | 4) Ligaments { | White fibrous tissue { Capsular as in Capsular Ligament,
{ Funicular as in External Lateral Ligament of the Knee-joint.
{ Fascicular as in Internal Lateral Ligament of the Knee-joint.
Yellow elastic tissue as the Ligamenta subflava. |
| | 5) Synovial Membrane ; { | Articular (found in the freely movable joints).
bursal { Bursae mucosae . cavities in the subcutaneous areolar tissues.
{ Synovial Bursae . found between muscles or tendons and bony prominences.
Vaginal (sheaths surrounding the tendons as they pass through osseous-fibrous canals [in the hand and foot]). |

As soon as the Articular Synovial Membrane of a joint is injured we speak of a **wound of a joint**, otherwise of a **wound at a joint**.

The articular lamella, to which the cartilage is attached differs from ordinary bone tissues by having no Haversian canals, no Canaliculi and the Lacunae are longer.

Classification of the Articulations :

- 1) **Synarthrosis** or immovable joints :
 - Sutura** (between the bones in the Cranium,
 - 1. Dentated, } 3. Dovetail,
 - 2. Serrated, } 4. Squamous).
 - Harmonia** (as in the Super. Maxillary bones).
 - Schindylesis** (Sphenoid and Vomer).
 - Gomphosis** (Teeth).

- 2) **Amphiarthrosis** or mixed joints :
 - Surfaces connected by fibro-cartilage** and not separated by synovial membrane as the joints between the bodies of the Vertebrae.
 - Surfaces covered by fibro-cartilage** and lined by a partial synovial membrane as in Sacro-Iliac and Pubic Symphyses.

- 3) **Diarthrosis** or movable joints :
 - Arthrodia**, or Gliding joint, as in Sterno and Acromio-Clavicular articulations.
 - Ginglymus**, or Hinge-joint, as in the Elbow, Ankle and Knee-joint.
 - Lateral ginglymus** or Diarthrosis Rotatorius, as in Superior Radio-Ulnar articulation and Atlo-Axoid joint.
 - Enarthrosis**, or Ball and Socket-joint, as in Hip and Shoulder-joints.

The Joints may be classified otherwise, into joints of

- 1 Continuity { Synarthrosis,
Amphiarthrosis,
- 2 Contiguity—Diarthrosis.

N. B.—In a Ginglymus or Hinge-joint the Lateral Ligaments are stronger than the Anterior and Posterior.

The Lateral Ligaments of the Knee-joint (as well as in all Ginglymus joints) are situated behind the axis of rotation. For this reason these Ligaments are relaxed in flexion (dislocation takes easy place in such a position).

LIGAMENTS OF THE DIFFERENT JOINTS:

I. In the Head:

Temporo-Maxillary articulation, viz:

External Lateral,
Internal “
Stylo-Maxillary,
Capsular,
Interarticular Fibro-Cartilage.

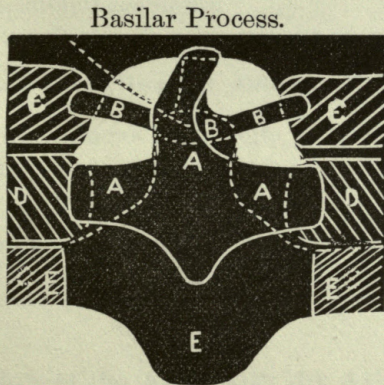
Articulation of the Occipital bone with the Atlas:

Two Anterior Occipito-Atloid,
Posterior Occipito-Atloid,
Two Lateral Occipito-Atloid,
Two Capsular.

Articulation of the Occipital bone with the Axis:

Occipito-Axoid,
Three Odontoid or check ligaments.

Vertical Section through the Foramen Magnum.



A, A, A, Transverse or Cruciform Ligament.
B, B, B, Check Ligaments.
C, C, Condyles of Occipital bone.
D, D, Section of the Ring of Atlas.
E, E, Axis with Odontoid process.

The Odontoid or Check Ligaments are strong fibrous cords, going from the apex of the Odontoid process upwards and outwards to either side to a rough depression on the inner side of each Occipital Condyle. They serve to limit the extent of rotation of the Head and Atlas around the Axis. (The articulation between the Head and Atlas allows only flexion and extension, commonly known as nodding; that between the Head, the Atlas, and the Axis—rotation laterally.)

II. In the Trunk :

1) Ligaments connecting the bodies of the Vertebrae :

Anterior Common Ligament,
Posterior “ “
Intervertebral substance.

2) Ligaments connecting the Laminae of the Vertebrae :

Ligamenta Subflava.

3) Ligaments connecting the Articular Processes :

Capsular Ligaments.

4) Ligaments connecting the Spinous Processes :

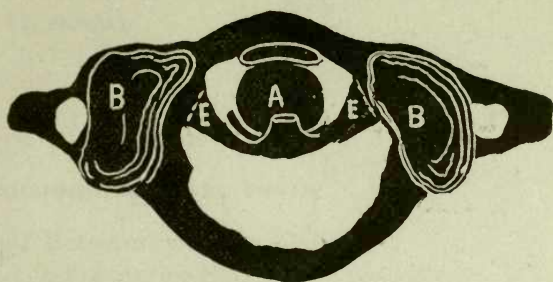
Inter-Spinous Ligaments,
Supra-Spinous “

5) Ligaments connecting the Transverse Processes :

Intertransverse Ligaments.

6) Articulation of the Atlas with the Axis :

Two Anterior Atlo-Axoid,
Posterior Atlo-Axoid,
Transverse,
Two Capsular.



A, Odontoid process of the Axis.

B, B, Articular Facets for the Condyles
of the Occipital bone.

E, E, Transverse Ligament.

The Transverse Ligament arches across the ring of the Atlas, dividing it into 2 parts; the anterior contains the Odontoid process of the Axis; the posterior the Spinal Cord and its membranes. Anterior and posterior to the Odontoid process are synovial membranes. The Transverse Ligament or **Cruciform Ligament** (because some fibres of it go from its superior and inferior border in a vertical direction to the Basilar process of the Occipital resp. to the root of the Odontoid process) sustains the Odontoid Pr. in its proper place near the anterior arch of the Atlas. As soon as this Ligament is broken the above named process presses on the Spinal Cord and Medulla Oblongata and death will be the result. This is the desired object in the process of hanging.

7) Articulations of the Ribs and Vertebrae:

- a) Between the heads of the ribs and the bodies of the Vert:

Anterior Costo-Vertebral Ligament,
Capsular,
Interarticular.

- b) Between the neck and tubercle of the ribs and transverse processes of the Vertebrae:

Anterior Costo-Transverse Ligament,
Middle “ “ or Interosseous,
Posterior Costo-Transverse,
Capsular.

8) Articulation of the Cartilages of the ribs with the Sternum :

Anterior Costo-Sternal Ligament,
Posterior “ “ “
Capsular.

9) Articulations of the Pelvis :

- a) Between Sacrum and Ilium :
Anterior Sacro-Iliac Ligament,
Posterior “ “ “
- b) Between Sacrum and Ischium :
Greater Sacro-Sciatic Ligament,
Lesser “ “
- c) Between Sacrum and Coccyx :
Anterior Sacro-Coccygeal,
Posterior “ “
Interarticular Fibro-Cartilage.
- d) Between the two Pubes bones :
Anterior Pubic,
Posterior “
Superior “
Sub “
Interarticular Fibro-Cartilage.

III. Extremities.

a, UPPER-EXTREMITY.

1) Sterno-Clavicular Articulation (arthrodial) :

Anterior Sterno-Clavicular Ligament,
Posterior “ “ “
Interclavicular,
Costo-Clavicular (Rhomboid),
Interarticular Fibro-Cartilage.

2) Scapulo-Clavicular Articulation (arthrodial) :

Superior Acromio-Clavicular,
Inferior “ “
Coraco-Clavicular } Trapezoid,
 } Conoid.
Interarticular Fibro-Cartilage.

3) Proper Ligaments of the Scapula :

Coraco-Acromial,
Transverse.

4) Shoulder-joint (Enarthrodial joint):

(7 **Motions**: flexion, extension, abduction, adduction,
rotation, circumduction, and stretching.)

3 Ligaments :

Capsular { long tendon of Biceps
 passes through.
Coraco-Humeral,
Glenoid.

The muscles in relation to this joint are:

Supraspinatus, above,
Triceps, below,
Subscapularis, internally,
Infraspinatus, } externally,
Teres Minor, }
Long tendon of Biceps, within.

These are commonly called Capsular muscles of the
Shoulder joint.

5) Elbow-joint (Ginglymus):

Anterior Ligament,
Posterior “

Internal Lateral (attached to the Internal Con-
dyle of Humerus and upper portion of
Ulna).

External Lateral (attached to the External Con-
dyle of Humerus and to the Orbicular Liga-
ment [not to the Radius]).

6) Radio-Ulnar Articulation (Lateral Ginglymus):

a) Superior articulation :

Orbicular Ligament (around the neck of the Radius.)

b) Middle articulation :

Oblique Ligament,
Interosseous “

c) Inferior articulation :

Anterior Radio-Ulnar,
Posterior “ “

Triangular Interarticular Fibro-Cartilage.

7) Wrist-joint (arthrodial):

External Lateral,
Internal “
Anterior “
Posterior “

8) Articulations of the Carpal bones :

- a) Articulations of the first row of the carpal bones (arthrodial):
 - two Dorsal Ligaments,
 - two Palmar “
 - two Interosseous Ligaments.
- b) Articulations of the second row of the carpal bones (arthrodial):
 - three Dorsal Ligaments,
 - three Palmar “
 - two Interosseous Ligaments.
- c) Articulations of the two rows of the carpal bones with each other (arthrodial):
 - Anterior or Palmar,
 - Posterior or Dorsal,
 - External Lateral,
 - Internal Lateral.

9) Carpo-Metacarpal Articulations (arthrodial):

- a) 1st Metacarpal with Trapezium:
 - Capsular Ligament,
 - Synovial Membrane.
- b) The other metacarpal bones with the Carpus:
 - Dorsal Ligaments,
 - Palmar “
 - Interosseous Ligaments.
- c) The metacarpal bones with each other:
 - Dorsal Ligaments,
 - Palmar “

10) Metacarpo-Phalangeal Articulation (Ginglymus):

Anterior Ligaments,
Two Lateral Ligaments.

11) Articulations of the Phalanges :

Anterior Ligaments,
Two Internal Ligaments.

B. Lower Extremity.

1) Hip-joint (enarthrodial) 5 ligaments:

Cotyloid Ligament,	}	Circumferential Ligaments.
Transverse “		

Capsular “	}	Connecting Ligaments.
Ilio-Femoral, “		
Ligamentum Teres,		

2) Knee-joint (Ginglymus) 5 external and 5 internal ligaments

External Ligaments,	{	Anterior or Ligamentum Patellae,
		Posterior or “ Posticum Winsolowii,
		Internal Lateral,
		Two External Lateral,
		Capsular.

Internal Ligaments,	{	Anterior Crucial,
		Posterior “
		Two Semilunar Fibro-Cartilages,
		Transverse,
		Coronary,
		Ligamentum Mucosum.—By some not considered [a ligament.]

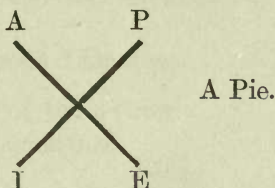
With the Ligamentum Patellae are connected 2 Bursae, Bursa Mucosa and the Synovial Bursa. The first one is situated between the Patella and the Integument. (An increase and swelling of this Bursa produces a condition which is known as “Housemaid’s Knee.”) The second one is situated behind the Ligament and the upper portion of the Tuberosity of the Tibia. In case of a tumor over the knee joint, feel for osseous tissues behind it, if there is any it is a Housemaid’s Knee, and you may easily aspirate it.

The Anterior Crucial Ligament goes from the External Condyle of the Femur to the anterior surface of the Tibia (in front of the Spine).

The Posterior Crucial Ligament goes from the Internal Condyle of the Femur to the posterior surface of the Tibia (behind the Spine).

In order to remember this, take the words, A Pie, and construct the annexed figure.

Crucial Ligaments of the Knee Joint.



The Hip and Knee-joint are principally supplied by the Obturator Nerve (a branch of the Lumbar Plexus, going to the muscles of the inside of the Thigh). Hence Hip diseases do often show as a symptom pain in the Knee-joint, or in the inside of the Thigh. Women also during confinement will complain about pain in these parts when the child's head presses against the Obturator groove and vessels. (Anterior lateral wall of the pelvis.)

3) Articulations between the Tibia and Fibula (arthrodial):

a) Superior Tibio-Fibular Articulation:

Anterior-Superior Tibio-Fibular Ligament,
Posterior “ “ “ “

b) Middle Tibio-Fibular Articulation:

Interosseous Membrane.

c) Inferior Tibio-Fibular Articulation:

Inferior Interosseous Ligament,
Anterior Inferior Tibio-Fibular Ligament,
Posterior “ “ “ “
Transverse Ligament.

The Inferior Interosseous Ligament is stronger than the Fibula. It is ruptured in Pott's fracture.

4) Ankle-joint (Ginglymus):

Anterior Ligament,
External Lateral Ligament,
Internal “ “

5) Articulations of the Tarsus (arthrodial), viz:

a) ¹Articulation of the first row:

External Calcaneo-Astragaloid Ligament,
Posterior “ “ “
Interosseous Ligament.

b) Articulation of the 2d row:

Dorsal Ligaments,
Plantar “
Interosseous.

c) Articulation of the two rows, with each other:

Between Os Calcis and Cuboid, 4:	{	Superior Calcaneo-Cuboid Ligament,		
		Internal “ “ “ (Interosseous),		
		Long “ “ “		
		Short “ “ “		

Between Os Calcis and Scaphoid, 2:	{	Superior Calcaneo-Scaphoid,		
		Inferior “ “ “		

6) Tarso-Metatarsal Articulation (arthrodial):

Dorsal Ligament,
Plantar “
Interosseous Ligament.

7) Metatarsal Phalangeal Articulations.

Plantar Ligament,
2 Lateral Ligaments,

8) Articulations of the Phalanges, are similar to those found in the Hand.

21 July

MYOLOGY.

The Muscles are classified into :

- 1) Involuntary Muscles, or Muscles of Organic Life,
and
- 2) Voluntary Muscles, or Muscles of Animal Life.

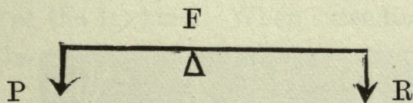
The involuntary muscles are not under the control of our will. They are supplied by the sympathetic nerve-system.

The voluntary muscles, or those which are under the influence of the will are about 400 in number. The greater part of them are in pairs. Muscles may be attached to bone or cartilage (Periosteum or Perichondrium), or to other muscles as in the tongue. The bones to which the muscles are attached represent **levers**.

A lever is an inflexible bar moving around a prop, on which act two or more forces and which is used to exert a pressure, to produce power or to overcome resistance.

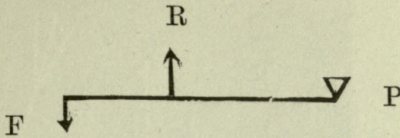
There are 3 different elements in a lever, viz: **Fulcrum, Resistance and Power**. The joints or the ground act as Fulcrum, the muscles as Powers, and the weight of the parts as Resistance. According to the relative position of these elements we divide the levers into 3 kinds, viz:

1st Kind of Lever,



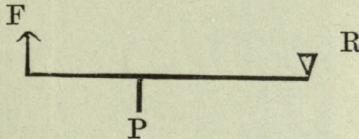
The Fulcrum is between the Power and the Resistance, as for instance: the Head moving on the Atlas (Fulcrum).

2d Kind of Lever,



The Resistance is between the Fulcrum and the Power as it is the case when we rise on tiptoe. The ground under the toes acts as Fulcrum, the weight of the body as Resistance, the Tendo-Achillis as Power.

3d Kind of Lever,



The Power is between the Fulcrum and Resistance, An example of this we have in flexion and elevation of the Forearm on the Arm. The weight of the Forearm acts as Resistance.

In order to find out to what kind a lever belongs, remember :

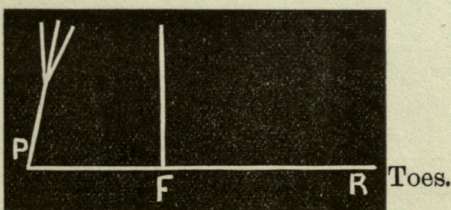
F. R. P.
1. 2. 3.

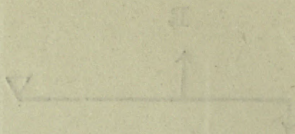
When F. stands in the middle it is a lever of the first kind, when R. it is a lever of the 2d kind, when P. of the 3d kind.

The 3 different kinds of levers are represented in the foot :

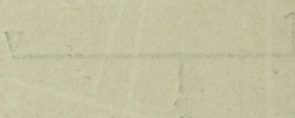
Lever of the 1st kind.—When extending the foot.

Gastrocnemius
Soleus
Plantaris





The fulcrum is between the effort and the load. An example of this is the head tilting on the neck. The fulcrum is the neck, the effort is the neck muscles, and the load is the head.



The fulcrum is between the effort and the load. An example of this is the foot standing on the ball. The fulcrum is the ball of the foot, the effort is the calf muscles, and the load is the body weight.

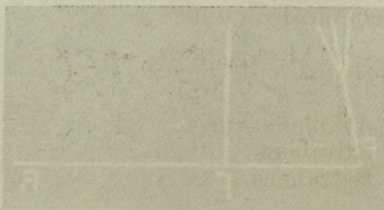
If you try to lift a weight with your foot, you will find it is a second class lever.

1. 2. 3.

When the fulcrum is in the middle it is a lever of the first kind. When the fulcrum is at the end it is a lever of the second kind.

The three different kinds of levers are represented in the foot:

1. The first kind—When extending the foot.



3) **Palpebral group,**

3 { Corrugator Supercilii,
Orbicularis Palpebrarum,
Tensor Tarsi.

4) **Orbital group,**

7 { Levator Palpebrae Superioris,
Rectus Superior,
" Inferior,
" Externus,
" Internus,
Obliquus Superior,
" Inferior.

5) **Nasal group :**

4 { Pyramidalis Nasi,
Levator Labii Superioris Alaeque Nasi,
Compressor Naris,
Depressor Nasi.

6) **Labial group,**

9 { Levator Labii Superioris, } To upper lip.
" Anguli Oris,
Zygomaticus Major,
" Minor,
Buccinator: to the Angle,
Levator Menti, } To lower lip.
Depressor Labii Inferioris,
" Anguli Oris, ^{Angle}
Risorius, sometimes wanting.

7) **Maxillary group, or Muscles of Mastication :**

4 { Temporal,
Masseter,
External Pterygoid,
Internal "

Motor Nerves of the Muscles of the Head,

Of the 31 pairs and one single muscle of the head are :

20 pairs and the single one supplied by the 7th Cranial Nerve, and

11 pairs of Muscles supplied by the 3d, 4th, 5th and 6th Cranial Nerves.

Of these last 11 pairs of muscles

The 4 muscles of mastication are supplied by the motor root of the 3d division of the 5th Cranial Nerve, and

The 7 muscles of the Orbit are supplied by the 3d, 4th and 6th Cranial Nerve, viz :

Levator Palpebrae Superioris,	} By the Motor Oculi or 3d Cranial Nerve.
Rectus Superior,	
“ Inferior,	
“ Internus,	
Obliquus Inferior,	

Obliquus Superior by the Patheticus or 4th Cranial Nerve.

Rectus Externus by the Abducens or 6th Cranial Nerve.

N. B. The **Orbicularis Palpebrarum Muscle** closes the eye, and is supplied by the Facial Nerve. Paralysis of the Facial or 7th Cranial Nerve will produce a condition in which the eye cannot be closed, known as **Lagophthalmia**.

The Levator Palpebrae lifts the eye lid and is supplied by the Motor Oculi or 3d Cranial Nerve. Paralysis of this nerve will produce a condition in which the eyelid cannot be lifted, known as **Ptosis**.

The Buccinator receives motor nerves from the Facial and from the motor root of the 5th Cranial Nerve. As proof for Facial paralysis see if the patient is able to whistle.

The Buccinator is pierced by **Steno's duct** of the Parotid gland. When this duct is injured or cut salivary fistula will often be the result.

Steno's duct is about 2-2½ inches in length, it crosses horizontally the Masseter Muscle, and perforates then the Buccinator. In order to find the direction of the duct, draw a line from the Tragus of the external ear to the root of the first incisor tooth of the Upper jaw; divide this line into 3 parts: The middle third will have the direction and length of Steno's duct crossing the Masseter Muscle. Steno's duct enters the cavity of the mouth opposite the 2d Molar tooth of the Upper Jaw.

The Tensor Tarsi Muscle regulates the course of the tears through the lachrymal ducts, by bringing the Puncta Lachrymalia in proper position (inwards), hence in Paralysis of this muscle, or of the 7th Cranial Nerve the tears will run over the cheeks (Epiphora).

The Tendo-Oculi crosses the lachrymal sac in front. In operations on this part place the bistoury behind the Tendo-Oculi, which you can feel and direct the point of the knife outwards in order not to cut the Angular Artery and Vein.

The Muscles of the Neck consist of 45 pairs and one single one:

They are arranged in 9 groups:

1) Superficial Lateral group:

2 { Platysma Myoides,
Sterno-Cleido-Mastoid.

2) Infra Hyoid group,

4 { Sterno-Hyoid,
Sterno-Thyroid,
Omo-Hyoid,
Thyro-Hyoid.

3) Supra Hyoid or Genio-Hyoid group:

6 { Anterior belly of Digastricus,
Mylo-Hyoid,
Genio-Hyoid,
Genio-Hyo-Glossus,
Hyo-Glossus,
Lingual.

4) Submaxillary group :

- 3 { (Posterior belly of Digastricus),
 Stylo-Hyoid,
 " Glossus,
 " Pharyngeus.

5) Prevertebral group :

- 7 { Longus Colli,
 Rectus Capitis Anticus Major,
 " " " Minor,
 " " Lateralis,
 Scalenus Anticus,
 " Medius,
 " Posticus.

6) Posterior Cervical group :

- 8 { Splenius Capitis,
 Trachelo-Mastoideus,
 Complexus,
 Biventer Cervicis,
 Obliquus Superior,
 " Inferior,
 Rectus Capitis Posticus Major,
 " " " Minor,

7) Muscles of the Soft Palate :

- 5 { Palato Glossus, } Pillars of the
 " Pharyngeus, } Fauces.
 Levator Palati,
 Tensor "
 Azygos Uvulae.

8 Muscles of the Pharynx.

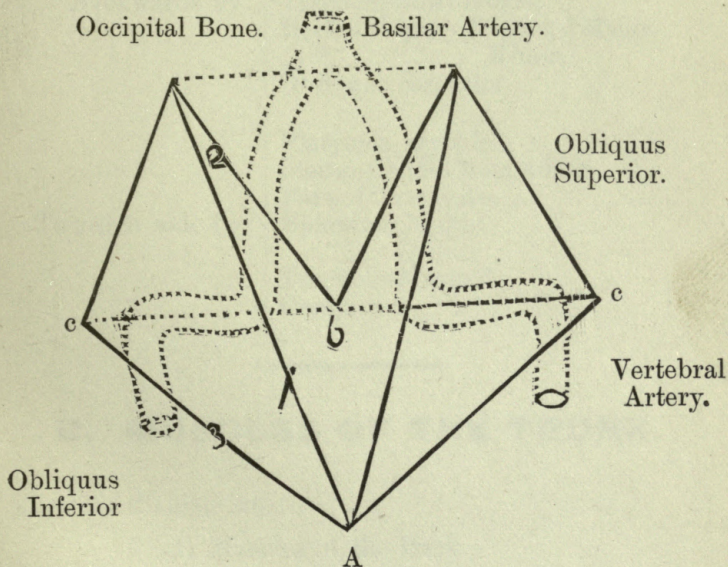
- 2 { Superior Constrictor of the Pharynx,
 Middle " " "
 Inferior " " "

9) Muscles of the Larynx,

- 8 { Crico-Thyroid,
 Crico-Arytaenoideus Posticus,
 " " Lateralis,
 Thyro-Arytaenoideus,
 Arytaenoideus (single muscle),
 Thyro-Epiglottideus,
 Arytaeno-Epiglottideus Superior,
 " " Inferior.

N. B. The Pentagon is a five sided figure formed by the following muscles, on the posterior surface of the neck;

Obliquus Superior } on either side.
Obliquus Inferior }
Superior curved line of Occipital Bone above.



1. Rectus Capitis Posticus Major.
2. " " " Minor.
- A. Spinous process of the 2d Cervical Vertebra.
- b. " " " 1st " "
- c. Transverse process of the 1st " "

The Triangle formed by the two Oblique muscles, and the Rectus Capitis Posticus Major is important as we find herein the Vertebral Artery, winding behind the articular process of the Atlas.

The Head is moved :

Forwards by :	{	Platysma Myoides, Sterno-Cleido-Mastoideus, Rectus Capitis Anticus Major, Complexus.
Backwards by :	{	Part of Trapezius, Splenius Capitis, Complexus. Trachelo-Mastoideus, Rectus Capitis Posticus Major, “ “ Minor, Obliquus Superior.
To either side by :	{	Platysma Myoides, Sterno-Cleido-Mastoideus, Part of Trapezius, Splenius Capitis, “ Colli. Trachelo-Mastoid, Complexus.

B. MUSCLES OF THE TRUNK.

They are divided into :

- 1) Muscles of the Back.
- 2) “ “ Thorax.
- 3) “ “ Abdomen.
- 4) “ “ Perineum.

Muscles of the Back, or better, ON the Back are arranged in 5 layers, numerated from the Integument towards the bones :

1st layer, { Trapezius.
2 muscles, { Latissimus Dorsi.

2d layer, { Levator Anguli Scapulae,
3 muscles, { Rhomboideus Minor,
“ “ Major,

3d layer { Serratus Posticus Superior,
2 muscles, { “ “ Inferior.

The 4th layer, 8 muscles, is divided into 3 regions :

a) Lumbar region: Erector Spinae,—1 muscle.

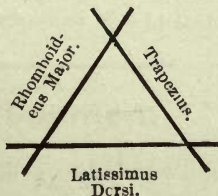
b) Dorsal region, $\left\{ \begin{array}{l} \text{Sacrolumbalis,} \\ \text{Longissimus Dorsi,} \\ \text{4 muscles,} \quad \text{Accessorius,} \\ \text{Spinalis Dorsi.} \end{array} \right.$

c) Cervical region, $\left\{ \begin{array}{l} \text{Cervicalis Ascendens,} \\ \text{Transversalis Colli,} \\ \text{3 muscles,} \quad \text{Spinalis Colli.} \end{array} \right.$

The 5th Layer, $\left\{ \begin{array}{l} \text{Semispinalis Dorsi,} \\ \text{Semispinalis Colli,} \\ \text{8 muscles,} \quad \text{Multifidus Spinae,} \\ \text{Rotatores Spinae,} \\ \text{Supraspinales,} \\ \text{Interspinales,} \\ \text{Transversales,} \\ \text{Extensor Coccygis.} \end{array} \right.$

The first two layers of the muscles of the Back act on the Upper Extremity.—The 3d layer acts as respiratory muscles: The Serratus Posticus Superior for inspiration, the Serratus Posticus Inferior for expiration. The 4th and 5th layers act on the vertebral column. The muscles of the 4th and 5th layers do not all act at the same time. They act alternately, otherwise the muscles would tire out, and men could not stand erect in one position for any great length of time.

On either side of the Back is a triangular space, formed by the borders of the Trapezius, Latissimus Dorsi and Rhomboideus Major muscle.



This space is not covered by muscles, hence very suitable for **auscultation and aspiration**. It corresponds to the 7th, 8th, and 9th rib. In order to find this space on the patient order him to fold his arms, and to bend

forwards, Then draw a line from the Spinous Process of the 12th Dorsal Vertebra to the Spine of the Scapula, a second line from the 5th Dorsal Vertebra to the inferior angle of the Scapula, and a 3d line from the 9th or 10th Dorsal Vertebra to the Inferior Angle.

N.B. The Trapezius forms at its attachment to the 7th Cervical, 1st, 2d, 3d, and 4th Dorsal Vertebra an **elliptical space consisting of white fibrous tissues, forming a favorable spot for rheumatic affections.** The same thing takes place where the Trapezius is attached to the Spine of the Scapula, and below it.

Muscles of the Thorax : 5 sets:

- 1) **Intercostales Externi** (11 pairs), fibres going downwards and forwards.
- 2) **Intercostales Interni** (11 pairs), fibres going downwards and backwards.
- 3) **Infracostales**, fibres running oblique.
- 4) **Levatores Costarum** (12 pairs), inserted to the Tubercle and Angle of the ribs.
- 5) **Triangularis Sterni**, behind the Sternum and internal Mammary vessels.

The External Intercostal muscles and Levatores Costarum raise the ribs, enlarge the thoracic cavity, and are therefore muscles of inspiration. The Internal Intercostal muscles and the Triangularis Sterni depress the ribs, and are muscles of expiration.

Muscles of the Abdomen.

The Abdomen is of an ovoid shape and its boundaries are :

- 1) **Above :** the Diaphragm.
- 2) **Below :** the Levator Ani and Coccygeus, which form the floor of the Pelvis.

3) Anteriorly : { Rectus Abdominis.
Pyramidalis.
Linea Alba and Lineae Semilunares.

4) Laterally : { Obliquus Externus muscle.
" Internus "
Transversalis.

5) Posteriorly : { Lumbar Vertebrae.
Crura of the Diaphragm.
Quadratus Lumborum.
Iliacus.
Psoas Magnus and Parvus Muscles.

The Muscles forming the Anterior and Lateral Walls of the Abdomen are :

- 1) Obliquus Externus.
- 2) " Internus.
- 3) Rectus Abdominis,
- 4) Pyramidalis.
- 5) Transversalis.
- (6) Quadratus Lumborum.) *posterior lateral.*

In the male is a 7th muscle :

the Cremaster muscle.

The fibres of the External Oblique muscle (Descending Oblique) run downwards and forwards.

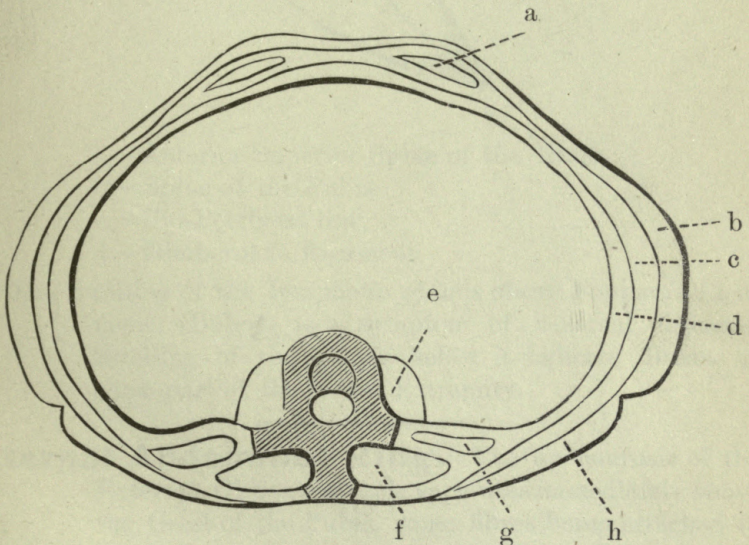
The fibres of the Internal Oblique muscle (Ascending Oblique) run upwards and inwards.

The fibres of the Transversalis run in a transverse direction.

The Aponeurosis of the Internal Oblique muscle divides anteriorly into two lamellae, between which the Rectus Abdominis muscle in the upper 3-4 of its course is situated. In the lower fourth of the Rectus the Aponeurosis of all 3 muscles (External, Internal Oblique, and Transversalis) pass in front of it.

The Aponeurosis of the Transversalis divides posteriorly into 3 lamellae. Between the most interior and the middle is situated the **Quadratus Lumborum**, and between the middle and exterior lamella the **Erector Spinae**.

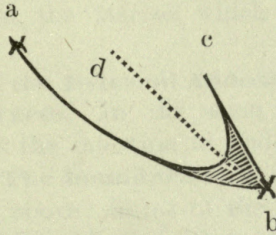
The abdominal muscles are supplied by the Lower Intercostal, Ilio-Hypogastric and Ilio-Inguinal Nerves.



- a. Rectus.
- b. External Oblique.
- c. Internal Oblique.
- d. Transversalis.
- e. Psoas Magnus.
- f. Erector Spinae.
- g. Quadratus Lumborum.
- h. Latissimus Dorsi.

The portion of the aponeurosis of the External Oblique muscle, which extends from the Anterior Superior Spine of the Ilium to the Spine of the Os Pubis is called: **Poupart's Ligament**. This is continuous with the Fascia Lata of the Thigh. (Flexion of the Leg on the Thigh relaxes therefore Poupart's Ligament).

Poupart's Ligament is a fibrous band, going from the Anterior Superior Spine of the Ilium to the Spine of the Pubis (forming a curve). The prolongation of Poupart's Ligament, attached to the Pectineal Line is called: **Gimbernats Ligament**. The form of this latter is triangular.

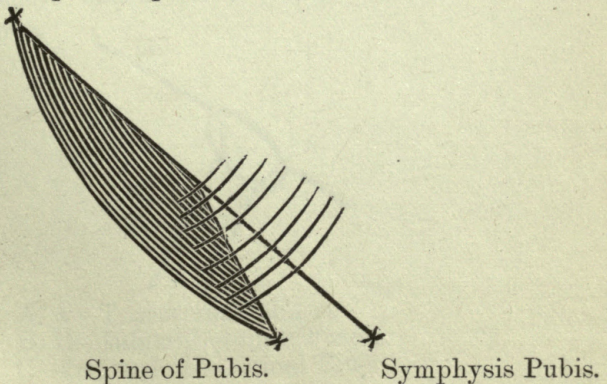


- a.=Anterior Superior Spine of the Ilium.
- b.=Spine of the Pubis.
- c.=Ilio-Pectineal line.
- d.=Gimbernats Ligament.

N. B.—Swelling of the lymphatic glands above Poupart's Ligament (Bubo) is a symptom of venereal diseases. Swelling of the glands below it indicate disease of some part of the Lower Extremity.

External Abdominal Ring. The aponeurosis of the External Oblique muscle separates immediately above the Crest of the Pubis, some fibres being attached to the Spine and some to the Symphysis Pubis, in this way forming a **triangular opening** called: **External Abdominal Ring**.

- a. Superior Spine of the Ilium.

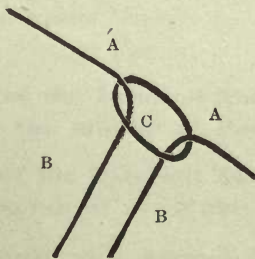


The margins of the aponeurosis form the pillars of the ring. Some fibres of a very thin fascia cross this triangular opening in order to strengthen this weak point of the wall of the abdomen, and make it rather quadrilateral. These fibres are known as the **Intercolumnar Fascia** or **External Spermatic Fascia**, from being the most external of the fasciae, which cover the Spermatic Cord.

The direction of the External Abdominal Ring is upwards and outwards. In the same direction we have to bring back the intestine in Indirect Inguinal Hernia (Taxis). **The boundaries** of it are below: Crest of Os Pubis, above: fibres of the Intercolumnar Fascia, and on either side the pillars of the ring.

The External Abdominal Ring forms one end of the **Inguinal Canal**, which transmits in the male the Spermatic Cord and in the female the Round Ligament of the Uterus. The other endpoint of this canal is the **Internal Abdominal Ring**.

The Internal Abdominal Ring is situated in the structure of the **Transversalis Fascia**, a thin aponeurotic membrane situated between the Transversalis muscle and the Peritoneum. The boundaries of this ring are above: the fibres of the Transversalis muscle, and downwards and internally the deep Epigastric vessels. A funnel shaped form of membrane called: **Infundibuliform Fascia** (part of the Transversalis Fascia) is carried by the Spermatic Cord or Round Ligament through the Internal Abdominal Ring, and forms therefore one of the coverings of Indirect Inguinal Hernia.



A, A—Transversalis Fascia.
B, B—Infundibuliform Fascia.
C—Internal Abdominal Ring.

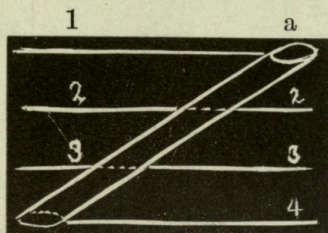
The canal between the External and Internal Abdominal Ring is called **the Inguinal Canal**. It is about $1\frac{1}{2}$ inches in length, it is parallel with, and a little above Poupart's Ligament.

It is formed by the following 4 structures :

- 1) Transversalis Fascia.
- 2) " Muscle.
- 3) Obliquus Internus.
- 4) " Externus.

See the following diagram :

Anterior or Exterior Side.



Posterior or Inferior Side.

a—External Abdominal Ring.

b—Internal Abdominal Ring.

Anterior to the Inguinal Canal are the :

Obliquus Externus.

 " Internus.

Transversalis Muscle.

Posterior :

Obliquus Internus.

Transversalis Muscle.

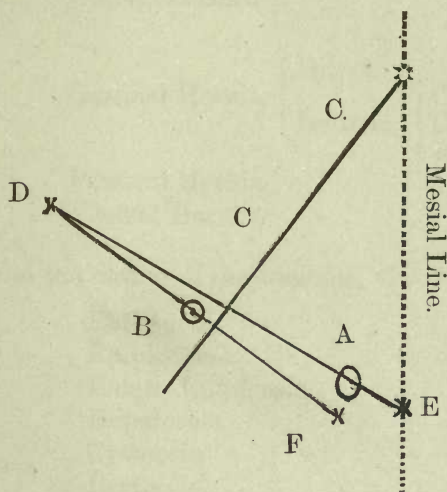
 " Fascia.

The exact place of the Internal Abdominal Ring is $1\frac{1}{2}$ inch above the middle of Poupart's Ligament.

The exact place of the External Abdominal Ring is just above the Spine of the Pubis.

Between the External and Internal Ring is situated the **Deep Epigastric Artery**. The exact place for this vessel is the centre of a line drawn from the

Anterior Superior Spine of the Ilium to the Symphysis Pubis, going from here in the direction to the Umbilicus (between the Transversalis Fascia and Peritoneum).



- A—External Abdominal Ring.
- B--Internal Abdominal Ring.
- C, C—Deep Epigastric Artery.
- D--Anterior Superior Spine of Ilium.
- E--Symphysis Pubis.
- F--Spine of the Pubis.

The Deep Epigastric Artery is situated internal to the Internal Abdominal Ring and external to the External Abdominal Ring.

HERNIA.

Is a protrusion of a viscus from its natural cavity. So we may have Cerebral Hernia, Hernia of the Lungs, etc.

When we speak of Hernia in general, we mean Abdominal Hernia.

Hernia (abdominal) may be named ;

1st. From the situation, viz. :

Umbilical Hernia.

Inguinal Hernia, { Direct.
 { Indirect, { Common (Scrotal)
 { Congenital.
 { Infantile.

Femoral Hernia.

Ventral Hernia.

2d. From the nature of the contents, viz. :

Enterocoele.

Epiplocele.

Entero-Epiplocele.

Hepatocele.

Cystocoele.

Rectocoele,

3d. From the nature of the protruded part, viz.:

Reducible.

Irreducible.

Strangulated.

In Umbilical Hernia, the Hernia protrudes through the Umbilicus.

Inguinal Hernia is situated in the Inguinal Region, and may be indirect (oblique) or direct.

Oblique or Indirect Inguinal Hernia is a protrusion of intestine through the Internal Abdominal Ring, following the course of the Inguinal canal. The Deep Epigastric Artery is situated internal to the Hernia.

Direct or Internal Inguinal Hernia is a protrusion of intestine direct through the abdominal wall on the inner side of the Deep Epigastric Artery (Hesselbach's Triangle).

In operations for Hernia, make the incision parallel to this artery so that it does not become cut. Put the back of your knife towards the artery. In order to do this exact diagnosis must be made as to what kind of Hernia you have before you.

Coverings of Inguinal Hernia.

Indirect or Oblique Hernia :

Peritoneum.
Subserous cellular tissues.
Infundibuliform process of Transversalis Fascia.
Cremaster Muscle.
Intercolumnar Fascia.
Superficial and Deeper Fascia.
Integument.

Direct Oblique Hernia :

Peritoneum,
Subserous cellular tissues.
Transversalis Fascia.
Conjoined Tendon.
Intercolumnar Fascia.
Superficial and Deeper Fascia.
Integument.



Scrotal Hernia.



Congenital Hernia.



Infantile Hernia.

In Congenital (Indirect Inguinal) Hernia the Tunica Vaginalis forms the sac of the Hernia as it is the case in the lower animals. The usual obliteration of the peritoneal canal formed by the descent of the testicle has not taken place, and the contents of the hernia pass along this canal and enlarge it.

In Infantile (Indirect Inguinal) Hernia the hernial sac is situated behind the Tunica Vaginalis, and there are therefore 3 layers of serous membrane covering the intestine. (See the diagram on page 228.)

Femoral Hernia is the hernia named, when the protrusion passes through the Femoral Ring (below Poupart's Ligament).

Ventral Hernia is the general name for any Abdominal Hernia, which is not an Umbilical, Inguinal or Femoral Hernia.

Epiplocele is the name of a hernia, that only contains a portion of Peritoneum.

Enterocoele, when the hernia only contains a portion of Intestine.

Entero-Epiplocele, when the hernia contains a portion of (Peritoneum and Intestine.)

Hepatocele, when the hernia contains a part of the liver.

Cystocoele, when the hernia is formed by a part of the bladder.

Bubonocoele is a hernia limited to the groin.

The Spermatic Cord is about 5 inches in length, and goes from the Globus Minor of the Epididymis to the Internal Abdominal Ring. It is formed by :

1. **Spermatic Arteries** (spermatic art., artery of the Vas Deferens and Cremastic Artery).

2. **Spermatic Veins.**

3. **Spermatic Lymphatics.**

4. **Spermatic Nerves, and the**

5. **Vas Deferens** which carries the semen. It is about 24 inches in length, and is the continuation of the Epididymis. It commences at the lower part of the Globus Minor, ascends along the posterior side of the testis, and along the backpart of the Spermatic Cord, through the Inguinal Canal, to the Internal Abdominal Ring. From here it descends into the Pelvis at the side of the Bladder, and lies between it and the Rectum. At the base of the Prostate it unites with the duct of the Vesiculæ Seminales to form the Ejaculatory Duct (3-4 inches in length).

Diaphragm is an involuntary muscle in the shape of an arc or dome (its concavity is downwards). It separates the Thoracic from the Abdominal cavity.

Its points of attachment are :

Ensiform cartilage of Sternum.

Cartilages and bony portions of the 6 or 7 lower ribs.

Ligamentum Arcuatum Externum and Internum.

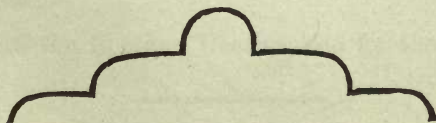
Lumbar Vertebrae (Crura of the Diaphragm);

This Muscle resembles a voluntary muscle in the following respects :

- 1) In its large size.
- 2) In having bony attachments.
- 3) In having a tendon (in its centre).

The Diaphragm forms 5 tendinous arches :

The centre arch is for the Aorta, the two others on either side for the Ligamenta Arcuata.



The Diaphragm has 3 large openings and several small ones.

The 3 large openings are :

1) **Aortic opening**, which transmits the

Aorta,	} this opening
Vena Azygos Major,	
Thoracic Duct,	
	} is tendinous,
	} partly osseous.

2) **Oesophageal opening** (muscular in structure) formed by the 2 Crura :

for the Oesophagus, and the
2 Pneumogastric Nerves.

3) **Foramen Quadratum** (tendinous in structure) for:
the Vena Cava Ascendens.

The Aortic Opening corresponds to the 12th Dorsal Vertebra.

The Oesophageal “ “ 10th “ “

The Foramen Quadratum “ “ 9th “ “

The Diaphragm is supplied by the Phrenic Nerves (which come from the 3d, 4th and 5th Cervical Nerves, and go to the **lower surface** of the Diaphragm). In this way the weight of the Lungs does not press on the nerves.

N.B.—The Diaphragm gets also nerve supply from the Solar Plexus of the Sympathetic nerves, which we experience in **Hiccough** or Singultus, produced by a sudden and involuntary contraction of the Diaphragm and a simultaneous contraction of the Glottis. In the same way the Solar Plexus of nerves brings the Diaphragm in connection with the alimentary canal.

The Thoracic Cavity becomes increased when the Diaphragm acts. This muscle is therefore a muscle of inspiration.

Its antagonistic muscles are the Levator Ani and Coccygeus (which form the floor of the pelvis).

In the **Levator Ani** are **2 openings** in the male, and 3 in the female :

These are for the Rectum, Urethra and for the Vagina.



The more important openings in the walls of the Abdomen are 10 in number,

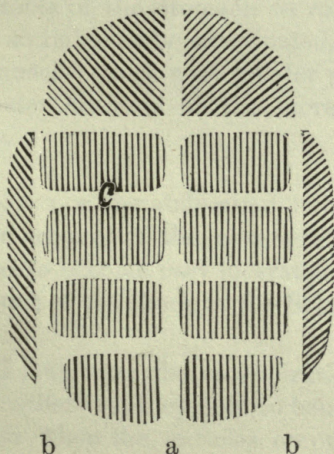
(11 in female), viz:

- 1) Upper wall 3: { Hiatus Aorticus or Aortic opening.
Foramen Quadratum.
Oesophageal opening.
- 2) Lower wall 4: { 2 Femoral rings.
Opening for Urethra.
Opening for Rectum.
- 3) Anterior wall: Umbilicus.
- 4) Lateral wall: 2 Internal Abdominal rings.

In the female: Opening for the Vagina.

When the Integument and Fascia are removed in dissection we see the following **white lines**, formed by the joining of the fibrous tendons of the corresponding muscles:

- a) Linea Alba in the median line,
- b) 2 Lineae Semilunares,
- c) 3 to 5 Lineae Transversae; these are analogous to ribs in lower animals.



The sheets of the muscles adhere to the Linea Alba and Semilunares very firmly, so that in cases of abscesses in the Rectus Muscle, the matter can only pass upwards or downwards.

B.—**Lineae Albicantes** are little white lines in the integument of the Abdomen caused by previous extension, as in cases of dropsy, pregnancy, tumors, etc.

In the Direction of the Linea Alba, the following operations are performed:

Caesarean section,
Ovariectomy,
Paracentesis of the bladder or aspiration,
High Pubic operation for stone.

N.B.—The muscles of the Abdomen are supplied by the lower Intercostal, Ilio - Hypogastric and Ilio - Inguinal Nerves. Hence in diseases of the Spine the patient may feel the pain in the Abdomen, because these nerves come from the Spinal nerves. So the seat of the pain is not always the seat of the disease.

The action of the abdominal muscles is, to compress the viscera by constricting the cavity of the abdomen. So the foetus is expelled from the Uterus, the feces from the Rectum, the urine from the Bladder and the contents of the Stomach in vomiting. Fat people are not so liable to be constipated, because their abdominal muscles work with greater power on account of the greater leverage of the more curved abdominal muscles.

Unexpected blows on the abdominal muscles are very dangerous on account of the non-resistance of the muscles (the viscera become easily lacerated in such cases), and on account of the shock to the Solar Plexus.

The abdominal muscles assist in expiration when the Spine is fixed, otherwise they help to bend the Thorax on the Pelvis or when the muscles on one side act alone to rotate the upper portion of the Trunk.

N.B.—**Tetanus Emprosthotonus** is produced by contraction of the Rectus Abdominis.

Tetanus Pleurothotonus is produced by contraction of the muscles of the lateral walls of the abdomen.

Tetanus Opisthotonus is produced by contraction of the muscles of the back.

Structures which are cut in penetrating wounds in the abdominal walls in the upper 3-4 of the Rectus Abdominis :

- 1) Integument.
- 2) Superficial and Deeper Fascia.
- 3) Tendon of the External Oblique muscle.
- 4) Anterior Lamella of the tendon of Internal Oblique muscle.
- 5) Rectus Abdominis.
- 6) Posterior Lamella of the tendon of Internal Oblique.
- 7) Transversalis Muscle.
- 8) Transversalis Fascia.
- 9) Peritoneum.

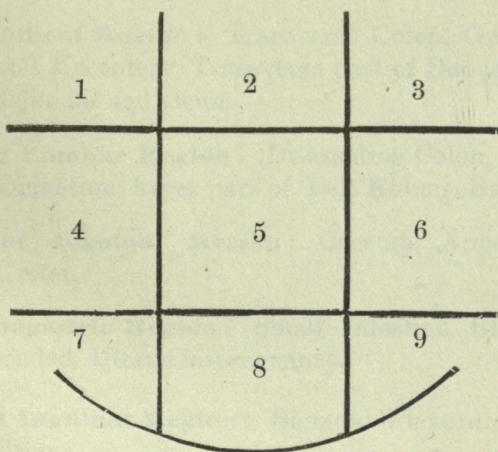
In wounds occurring in the lower fourth of the Rectus Abdominis :

- 1) Integument,
- 2) Superficial and Deeper Fascia,
- 3) Tendon of External Oblique,
- 4) " " Internal "
- 5) " " Transversalis muscle,
- 6) Rectus Abdominis resp. Pyramidalis.
- 7) Transversalis Fascia,
- 8) Peritoneum.

In wounds laterally :

- 1) Integument,
- 2) Superficial and Deep Fascia,
- 3) External Oblique,
- 4) Internal "
- 5) Transversalis,
- 6) Transversalis Fascia,
- 7) Peritoneum.

The Abdomen is artificially divided into 3 zones and 9 regions, by 2 horizontal and 2 vertical lines. The horizontal lines are drawn in the following manner: One through the Anterior Sup. Spin. Process of the Ilium, and the other through the costal cartilage of the 8th rib on either side. In this way are formed the **3 zones : Epigastric, Umbilical and Hypogastric Zones.** Each of these is again divided into **3 regions :** by 2 vertical lines drawn from the cartilage of the 8th rib to the centre of Poupart's Ligament, on either side.



- 1, Right Hypochondriac Region.
 - 2, Epigastric Region.
 - 3, Left Hypochondriac Region.
 - 4, Right Lumbar Region.
 - 5, Umbilical Region.
 - 6, Left Lumbar Region.
 - 7, Right Inguinal Region.
 - 8, Hypogastric Region.
 - 9, Left Inguinal Region.
-

Viscera contained in the different regions:

- 1) **Right Hypochondriac Region.** Right lobe of the Liver, Gall bladder, Duodenum, Pancreas, upper part of the Right Kidney, Right Suprarenal Capsule.
- 2) **Epigastric Region:** Middle portion and Pyloric End of Stomach, Left lobe of Liver, Lobulus Spigellii, Pancreas.
- 3) **Left Hypochondriac Region :** Splenic End of Stomach, Spleen, Pancreas, Splenic Flexure of Colon, Upper half of Right Kidney, Left Suprarenal Capsule.
- 4) **Right Lumbar Region:** Ascending Colon, lower part of Right Kidney, Small Intestine.
- 5) **Umbilical Region :** Transverse Colon, Great Omentum and Mesentery, Transverse part of Duodenum, part of Jejunum and Ileum.
- 6) **Left Lumbar Region:** Descending Colon, part of Great Omentum, lower part of Left Kidney, Small Intestine.
- 7) **Right Inguinal Region :** Caecum, Appendix Caeci, Ureter.
- 8) **Hypogastric Region:** Small Intestine, Bladder if distended, Uterus in pregnancy.
- 9) **Left Inguinal Region:** Sigmoid Flexure of Colon and Ureter.

Muscles of the Perineum:

Accelator Urinae (Sphincter Vaginae),
Erector Penis (Erector Clitoridis),
Transversus Perinei,
Compressor Urethrae,
Sphincter Ani,
Levator Ani,
Coccygeus.

C. Muscles of the Upper Extremity:

The 62 muscles connected with each Upper Extremity are divided into :

12—Extrinsic Muscles.

50—Intrinsic “

62

Under **extrinsic muscles** we understand muscles connecting the Upper Extremity with other parts of the body. **Intrinsic muscles**, on the contrary, are only attached to the Upper Extremity.

The **12 Extrinsic Muscles** are divided into :

3 Muscles connecting the Upper Extremity with the Head :

3 { Sterno-Cleido Mastoid,
Sterno-Hyoid,
Omo-Hyoid.

9 Muscles connecting the Upper Extremity with the Back and Thorax. 4 of these are anteriorly :

4 { Pectoralis Major,
“ Minor,
Subclavius,
Serratus Magnus,

and 5 Muscles are posteriorly : These 5 form the first 2 layers of the Muscles of the Back :

5 { Trapezius,
Latissimus Dorsi,
Rhomboideus Minor,
“ Major,
Levator Anguli Scapulae.

The **50 Intrinsic Muscles** are divided into :

7 Muscles connecting the Arm with Shoulder :

4 Muscles situated on the Arm,

20 “ “ “ “ Forearm,

19 “ “ “ “ Hand.

50

The 7 Muscles connecting the Shoulder with the Arm are :

7	{	Deltoid,
		Supraspinatus,
		Infraspinatus,
		Teres Minor,
		“ Major,
		Subscapularis,
		Coraco Brachialis.

The 4 Muscles situated on the Arm are :

anteriorly	{	Biceps Flexor Cubiti,
2		Brachialis Anticus.

posteriorly	{	Triceps Extensor Cubiti,
2		Subanconeus.

The 20 Muscles situated on the Forearm are :

20	{	Supinator Longus,
		Extensor Carpi Radialis Longior,
		“ “ “ Brevior,
		“ Communis Digitorum,
		“ Minimi Digiti,
		“ Carpi Ulnaris,
		Anconeus,
		Supinator Brevis,
		Extensor Ossis Metacarpi Pollicis,
		“ Primi Internodii “
		“ Secundi “ “
		“ Indicis,
		Pronator Radii Teres,
		“ Quadratus,
		Flexor Carpi Radialis,
		Palmaris Longus,
		Flexor Sublimis Digitorum,
		“ Carpi Ulnaris,
		“ Longus Pollicis,
		“ Profundus Digitorum.

The 19 Muscles situated on the Hand are divided into 3 regions :

1) Region of the Thumb,	4 Muscles,	} 19
2) “ “ “ Little Finger,	4 “	
3) Palmar Region,	11 “	

The Muscles of the Region of the Thumb are :

4 { Abductor Pollicis,
Opponens “
Flexor Brevis Pollicis,
Adductor Pollicis.

The Muscles of the Region of the Little Finger are :

4 { Palmaris Brevis,
Abductor Minimi Digiti,
Flexor Brevis Minimi Digiti,
Opponens Minimi Digiti.

The Muscles of the Palmar Region are :

11 { 4 Lumbricales,
3 Interossei Palmares,
4 “ Dorsales.

The 19 Muscles attached to the Hand are supplied with motive power by the following nerves :

4½ Muscles by the Median Nerve,
14½ “ “ Ulnar Nerve.

Distribution of the motor nerves, supplying the muscles which act on the Hand :

		Radial.	Median.	Ulnar.	Total.
Forearm : {	anterior surface	0	6½	1½	8
	posterior “	11	0	0	11
Hand, {	anterior surface	0	4½	14½	19
	posterior “	0	0	0	0
Total number,		11	11	16	38

Arterial and Nervous supply to the Palmar surface of the fingers :

	Nerves.	Artery.	Total.
Median,	3½	1½	5
Ulnar,	1½	3½	5
Total,	5	5	10

Distribution of the Motor Nerves of the Intrinsic Muscles of the Upper Extremity :

Nerves.	Scapula Humeral Region.	Hu- meral.	Fore- arm.	Hand.	Total.	
Supra-Scapular.	2	—	—	—	2	2
Sub-Scapular.	2	—	—	—	2	2
Circumflex.	2	—	—	—	2	2
Musculo-Cutan- eous or External- Cutaneous.	1	2	—	—	3	3
Internal Cutan- eous or Musculo- Spiral.	—	2	3	—	5	} 14
Posterior Interosseous.	—	—	9	—	9	
Median.	—	—	4	4½	8½	} 11
Anterior Interosseous.	—	—	2½	—	2½	
Ulnar.	—	—	1½	—	1½	} 16
Superficial Palmar.	—	—	—	1	1	
Deep Palmar.	—	—	—	13½	13½	
Total,	7	4	20	19	50	50

N. B.—For the Nerves supplying each special muscle see the corresponding place in Neurology :

The Scapula is moved :

Upwards by : { Trapezius,
Levator Anguli Scapulae,
Rhomboides Major,
“ Minor.

Downwards by : { Lower part of Trapezius,
Latissimus Dorsi,
Pectoralis Minor.

Forwards by : { Pectoralis Minor,
Serratus Magnus.

Backwards by : { Trapezius,
Rhomboideus Major,
" Minor,
Latissimus Dorsi.

The Humerus is moved :

Forwards by : { Part of Deltoid,
" " Pectoralis Major.

Assisted by : { Biceps,
Coraco-Brachialis.

Backwards by : { Part of Deltoid,
Teres Major,
" Minor,
Long Head of Triceps,
Latissimus Dorsi.

Inwards by : { Part of Pectoralis Major,
Latissimus Dorsi.

Rotated inwards by : Subscapularis.

Assisted by : { Pectoralis Major,
Latissimus Dorsi,
Teres Major.

Outwards by : { Supraspinatus,
Infraspinatus,
Teres Minor.

The Forearm is moved :

Forwards by : { Biceps,
Brachialis Anticus,
Pronator Teres.

Assisted by : { Flexor Carpi Radialis,
" " Sublimis,
" " Ulnaris,
Supinator Longus.

Backwards by : { Triceps,
Anconeus.

Rotated inwards by : { Pronator Teres,
Flexor Carpi Radialis,
Palmaris Longus,
Flexor Sublimis,
Pronator Quadratus.

Outwards by : { Biceps,
Supinator Brevis,
Extensor Secundi Internodii.

The Deltoid lifts the arm up to 65 or 70°, and is supplied by the Circumflex Nerve. Its arterial supply it receives from the Anterior and Posterior Circumflex Arteries.

The Biceps acts not only as a flexor, but also a supinator.

The Muscles acting on the Hand are 38 in number, and these may be arranged in the following way :

1)	Muscles acting on the Hand as a unit,	10	Muscles.
2)	“ “ “ fingers in common,	3	“
3)	“ “ “ special fingers	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Thumb, 8</div> <div style="display: inline-block; vertical-align: middle;">Index, 4</div> <div style="display: inline-block; vertical-align: middle;">Middle, 3</div> <div style="display: inline-block; vertical-align: middle;">Ring, 3</div> <div style="display: inline-block; vertical-align: middle;">Little, 6</div> </div> <div style="display: inline-block; vertical-align: middle; font-size: 2em;">}</div> <div style="display: inline-block; vertical-align: middle;">24</div> </div>	“
4)	Integument, - - - -	1	
		38	“

Adduction of the Hand is produced by the simultaneous action of the

Flexor Carpi Ulnaris, and
Extensor “ “

Abduction of the Hand by the action of the

Flexor Carpi Radialis, and
Extensor “ “ Longior,
Extensor “ “ Brevior.

Adduction of the Hand is stronger than abduction.

Table showing the action and distribution of the 38 Muscles acting on the hand.

	Prona-tors.	Supina-tors.	Flexors.	Exten-sors.	Adduc-tors.	Abduc-tors.	Muscles.	Tendons.
1) Hand as unit:	2	2	3	3	—	—	10	10
2) Finger in common:	—	—	2	1	—	—	3	—
{ Thumb,	—	—	3	3	1	1	8	8
{ Index,	—	—	1	1	1	1	4	7
{ Middle,	—	—	1	—	1	1	3	6
{ Ring,	—	—	1	—	1	1	3	6
{ Little,	—	—	3	1	1	1	6	9
4) Integu-ment:	—	—	—	—	1	—	—	1
Total,	2	2	14	9	6	5	38	47

N. B. The Extensor Communis Digitorum is attached to the 2d and 3d phalanges of the 2d, 3d, 4th and 5th fingers. From the tendon going to the Ring finger, two tendinous slips go to the tendons of the 3d and 5th fingers. This is the reason the Ring-finger is not so freely moveable as the other fingers.

4) Crural Region : 12 Muscles, divided into 4 groups :

- a) Superficial { Gastrocnemius,
Posterior { Soleus,
3 Muscles : { Plantaris.
- b) Deeper { Flexor Longus Digitorum,
Posterior, { Tibialis Posticus,
3 Muscles : { Flexor Longus Pollicis.
- c) Anterior, { Tibialis Anticus,
3 Muscles : { Extensor Proprius Pollicis,
 " Longus Digitorum.
- d) Lateral, { Peroneus Longus,
3 Muscles : { " Brevis,
 " Tertius.

5) Pedal Region : 20 Muscles ; these are arranged as follows :

1 Muscle to the Dorsal surface :

Extensor Brevis Digitorum.

19 Muscles to the Plantar surface, and these are
— again divided into 4 layers, counted
20 from the integument to the bones :

The 1st layer, 3 Muscles :

3 { Abductor Pollicis,
 { Flexor Brevis Digitorum,
 { Abductor Minimi Digiti.

The 2d layer, 5 Muscles :

5 { Flexor Accessorius and
 { 4 Lumbricales.

The 3d layer, 4 Muscles :

4 { Flexor Brevis Pollicis,
 { Adductor Pollicis,
 { Transversus Pedis,
 { Flexor Minimi Digiti.

The 4th layer consists of 7 Interossei.

There are 4 Dorsal { counted from
and 3 Plantar { the Tibia to
Interossei. { the Fibula.

After removing the Integument and Superficial and Deeper Fascia of the Thigh, we see a dense, shining, fibrous aponeurosis, which forms a uniform investment for this region of the limb. This fascia is called: **Fascia Lata.**

The Fascia Lata presents on its inner side, below Poupart's Ligament, an opening: **Saphenous Opening**, through which the Internal Saphenous Vein passes in order to join the Femoral Vein. This opening is surrounded by the **Superficial Inguinal Glands**, which are divided into 2 groups :

- 1) Those situated above Poupart's Ligament.
- 2) " " below " "

The first kind receive lymphatic vessels from the Penis, Scrotum, Perineum and lower part of Abdomen. Hence in **venereal diseases** we have swelling of the glands above Poupart's Ligament.

The second kind receive lymphatic vessels from the Lower Extremity. A swelling of these will therefore indicate a diseased condition of the foot or any other portion of the Lower Extremity.

The portion of the deeper layer of the Superficial Facia, which covers the Saphenous Opening is called: **Cribriform Fascia**, because it is perforated like a sieve by many blood and lymphatic vessels.

This Cribriform Fascia forms one of the coverings of Femoral Hernia.

Femoral Hernia is a protrusion of the intestine through the **Crural Canal**. (The neck of Femoral Hernia is always below Poupart's Ligament, and the neck of Inguinal Hernia above.)

The Crural Canal is about $\frac{1}{4}$ — $\frac{1}{2}$ of an inch in length, and extends from Gimbernat's ligament to the Saphenous Opening.

The Canal has 2 openings :

Femoral or Crural Ring, and
Saphenous Ring.

The Femoral Ring has for its Boundaries:

Above and anteriorly: Poupart's Ligament.
internally: Gimbernats Ligament.
Below and posteriorly: Os Pubis.
externally: Femoral Vein.

Relation of the Femoral Ring:

Above Spermatic Cord, (in the female: Round Ligament of the Uterus.)

Externally: Femoral Vein, Epigastric Artery over the outer and upper angle of the opening.

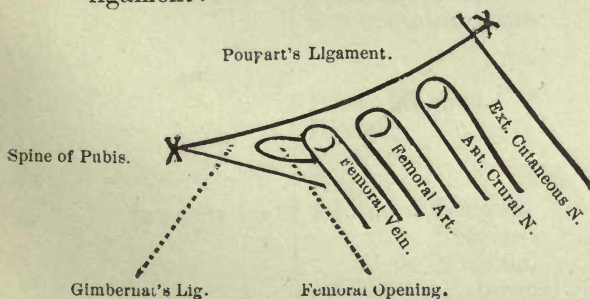
Below: Os Pubis.

In front: Communicating branch between Epigastric and Obturator Artery.

In an operation for strangulated Femoral Hernia, we have to cut in the direction inwards and upwards. When you try to apply Taxis, the Thigh should be always flexed upon the Pelvis, and at the same time adducted and rotated inwards in order to relax the openings of the Crural Canal.

Taxis in Femoral Hernia must be made in the direction downwards, backwards and upwards. (**In Inguinal Hernia** upwards and outwards.)

Order of the different objects situated behind Poupart's ligament:



G—Gimbernats Ligament,
O—Femoral Opening,
V— " Vein,
A— " Artery,
N—Anterior Crural Nerve.

(See page No. 100.)

Coverings of Femoral Hernia from within outwards:

Peritoneum,
 Subserous areolar tissue,
 Septum Crurale (covering the femoral opening.)
 Crural Sheath,
 Cribriform Fascia,
 Superficial Fascia,
 Integument.

The Thigh is moved:

Forwards by: { Psoas Magnus,
 Iliacus,
 Tensor Vaginae Femoris,
 Pectineus,
 Adductor Longus,
 " Brevis.

Backwards by: { Gluteus Maximus,
 Part of Gluteus Medius,
 Piriformis,
 Obturator Internus,
 Part of Adductor Magnus,
 Long head of Biceps,
 Semitendinosus,
 Semimembranosus.

Inwards by: { Psoas Magnus,
 Iliacus,
 Pectineus,
 Gracilis,
 Adductor Longus,
 " Brevis,
 " Magnus,
 Obturator Externus,
 Quadratus Femoris.

Outwards by: { Tensor Vaginae Femoris,
 Gluteus Maximus,
 " Medius,
 " Minimus,
 Piriformis.

The Thigh is rotated :

Inwards by : { Tensor Vaginae Femoris,
Part of Gluteus Medius,
Sartorius.
Semitendinosus.

Outwards by : { Gluteus Maximus,
Part of Gluteus Medius,
Pyriformis,
Gemellus Superior,
Obturator Internus,
Gemellus Inferior,
Obturator Externus,
Quadratus Femoris,
Psoas Magnus,
Iliacus,
Adductor Longus,
“ Brevis,
“ Magnus,
Biceps Flexor Cruris.

The Leg is moved :

Backwards
or flexed by : { Biceps,
Semitendinosus,
Semimembranosus,
Gracilis,
Sartorius,
Popliteus.

Extended by : { Rectus,
Crureus,
Vastus Externus,
“ Internus.

The Foot is moved :

Forwards or
flexed by : { Tibialis Anticus,
Extensor Proprius Pollicis,
“ Longus Digitorum,
Peroneus Tertius.

Backwards or flexed by:	{	Gastrocnemius,
		Plantaris,
	{	Soleus,
		Flexor Longus Digitorum,
	{	“ “ Pollicis,
		Tibialis Posticus,
	{	Peroneus Longus,
		“ Brevis.
Inclined outwards by:	{	Extensor Proprius Pollicis,
		Flexor Longus Digitorum,
	{	“ “ Pollicis,
		Tibialis Posticus.
Inclined inwards by:	{	Extensor Proprius Pollicis,
		Flexor Longus Digitorum,
	{	“ “ Pollicis,
		Tibialis Posticus.
Rotated outwards by:	{	Peroneus Longus,
		“ Brevis,
	{	Extensor Longus Digitorum,
		Peroneus Tertius.

The Tendo-Achillis is formed by the conjoined tendon of the Gastrocnemius and Soleus. It begins 2—3 inches above the lower portion of the Os Calcis. In the case of subcutaneous division of this tendon, keep the tendon extended, and go with the knife from the inside to the outside, because on the inside are the Posterior Tibial vessels.

The development of the Gastrocnemus and Soleus stands in reversed proportion to the length of the Os Calcis.

The Plantaris (sometimes uniting with the Tendo-Achillis,) is analagous to the Palmaris Longus in the Upper Extremity. The Tendon of the Plantaris is the longest tendon in the body. It looks like a thin, white, silk band, and can be stretched in its width.

The Extensor Longus Digitorum divides into 4 tendons, one for each of the 2, 3, 4, 5 toes. Its action is at first to extend the toes, and then to flex the Foot on the Leg.

The Flexor Longus Digitorum divides in the same way into 4 tendons, one for each toe, except the Great Toe, to which goes the Flexor Longus Pollicis.

The Flexor Longus Pollicis is stronger than the Flexor Longus Digitorum, because the action of the Great Toe in walking is the most important.

The order in which we find the vessels and tendons in the space between the Inner Malleolus and the Tendo Achillis is :

Inner Malleolus.

Tibialis Posticus,	T	} Remember : Timoty does vex all very nervous pupils. Each word begins with a letter indicating a corresponding muscle or vessel.
Flexor Longus Digitorum,	D	
Posterior Tibial Vein,	V	
“ “ Artery,	A	
“ “ Vein,	V	
“ “ Nerve,	N	
Flexor Longus Pollicis,	P	

Tendo Achillis.

We stand on 12 bones: 7 Tarsal and 5 Metatarsal bones, which form an arch from before backwards, and from side to side.

The arch is not perfect; that is, the bones do not support one the other by fitting like stones in an arch. They are kept in situ :

- 1) By the Plantar Fascia,
- 2) “ the Calcaneo-Scaphoid Ligament,
- 3) “ “ “ Cuboid Ligament.

The Plantar Fascia protects the vessels which are beneath it. The Calcaneo-Scaphoid Ligament gives the elasticity to the foot.

On standing, the foot becomes longer and broader, about $\frac{1}{2}$ — $\frac{3}{4}$ of an inch, because the weight of the body presses on the elastic arch of the foot. For the same reason the body is longer in the morning than in the evening, the steady weight of the body pressing the different Intervertebral Cartilages together.

Of the 60 Muscles attached to the Lower Extremity are :

15 supplied by the Lumbar Plexus, and
45 " " " Sacral Plexus.

All the Muscles of the Foot, except the Extensor Brevis Digitorum, are supplied by the External and Internal Plantar Nerves, branches of the Posterior Tibial Nerve. The Extensor Brevis Digitorum is supplied by the Anterior Tibial Nerve.

The Great Toe cannot act without moving the other toes, because the tendon of the Flexor Longus Pollicis (going to it) is connected with a small tendinous slip to the Flexor Accessorius.

Physiological Classification of Muscles and Tendons acting on the foot.

	Muscles of the Leg.	Muscles of the Foot.	Whole number of Muscles.	Whole number of Tendons.
1) Foot as a whole	8	—	8	7
2) Toes in general	2	3	5	—
3) Toes in special.	1st	2	4	6
	2d	—	3	3
	3d	—	3	3
	4th	—	3	3
	5th	—	4	4
In all	12	20	32	42

Distribution of the Motor Nerves of the Muscles of the Lower Extremity :

Nerves.	Diac Reg.	Femoral Region.				Popliteal Reg.	Crural Region.				Pedal Region.		Muscles.
		Anter.	Inter.	Gluteal.	Post.		Anter.	Exter.	Post. Sup.	Post.	Dors.	Plant.	
Lumbar Plexus.	2	—	—	—	—	—	—	—	—	—	—	—	2
Anter. Crural,	1	6	—	—	—	—	—	—	—	—	—	—	7
Obturator,	—	—	5	1	—	—	—	—	—	—	—	—	6
Sacral Plexus,	—	—	—	5	—	—	—	—	—	—	—	—	5
Sup. Gluteal or Lumbo-Sacral,	—	1	—	2	—	—	—	—	—	—	—	—	3
Small Sciatic,	—	—	—	1	—	—	—	—	—	—	—	—	1
Great Sciatic,	—	—	—	—	3	—	—	—	—	—	—	—	3
1. Popliteal,	—	—	—	—	—	1	—	—	3	—	—	—	4
2. Post. Tibial,	—	—	—	—	—	—	—	—	—	3	—	—	3
Intern. Plantar,	—	—	—	—	—	—	—	—	—	—	—	5	5
Extern. Plantar,	—	—	—	—	—	—	—	—	—	—	—	14	14
3. Peroneal,	—	—	—	—	—	—	—	—	—	—	—	—	—
Anter. Tibial,	—	—	—	—	—	—	3	1	—	—	1	—	5
Musco. Cutaneous,	—	—	—	—	—	—	—	2	—	—	—	—	2
	3	7	5	9	0	1	3	3	3	3	1	19	60
													60
													45
													15

N. B.—For the Nervous supply of each special muscle, see the corresponding place in Neurology.

Distribution of the Motor Nerves of the Mus-
cles of the Lower Extremity:

Nerves	Hip	Femoral Region				Crural Region				Pedal Region		Myoelectric
		Ant. fem.	Post. fem.	Pop.	Sci.	Ant. crur.	Post. crur.	Pop.	Sci.	Ant. ped.	Post. ped.	
Motor Nerves	2	3	2	0	1	3	3	3	3	1	11	60
Sciatic												
1. Femoral												
2. Post. Tibial												
3. Popliteal												
4. Small Saphenous												
5. Tibial												
6. Peroneal												
7. Sural												
8. Tibial												
9. Peroneal												
10. Sural												
11. Tibial												
12. Peroneal												
13. Sural												
14. Tibial												
15. Peroneal												
16. Sural												
17. Tibial												
18. Peroneal												
19. Sural												
20. Tibial												
21. Peroneal												
22. Sural												
23. Tibial												
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27. Peroneal												
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50. Tibial												
51. Peroneal												
52. Sural												
53. Tibial												
54. Peroneal												
55. Sural												
56. Tibial												
57. Peroneal												
58. Sural												
59. Tibial												
60. Peroneal												

the corresponding place in Nerve

2. N. B. - For the Nerve supply of each special nerve

ANGIOLOGY.

The agents of circulation are four, viz. : 1) Heart, 2) Arteries, 3) Capillaries, and 4) Veins.

The Heart is an involuntary muscle in the shape of a hollow cone, situated in the Thorax, and contains 4 cavities, viz. : **2 Auricles** and **2 Ventricles**. The auricles are situated at the Base, the ventricles at the Apex of the cone. The cavities of the Heart are separated from each other by a vertical partition, called, **the Septum**, in such a manner that there are on each side of the Septum an auricle and a ventricle (the cavities on the right side being the Right Auricle and Right Ventricle; those on the left side, the Left Auricle and Left Ventricle.)

There is no direct communication between the cavities situated on the right side and those on the left side of the Septum. **In each Auricle there are 5 openings**, by 4 of these, the mouth of Veins, the blood enters the auricle, and by one called the Auriculo-Ventricular Opening, the blood passes off or leaves the cavity. **In each Ventricle there are 2 openings**, by one of these, called the Auriculo-Ventricular Opening, the blood enters from the auricle by the other, called the Arterial Orifice, the blood passes out and enters an artery.

At each orifice of the Ventricles there is a valve; the one at the Auriculo-Ventricular allows the blood to enter the cavity, but prevents it from passing back or regurgitating; the other valve at the arterial orifice allows the blood to leave the cavity, but prevents it from returning. The contraction and dilatation of cavities of the same name are: **synchronous** and **isochronous**, while the contraction and dilatation of cavities of different names are **alternately**. (When a valve allows the blood to flow onwards, it is said to be open; when it prevents it from flowing backwards, it is said to be shut.)

In the Systole of the Heart the Auriculo-Ventricular Valves are shut, the Arterial Valves are open. **In the Diastole**, the Auriculo-Ventricular Valves are open and the Arterial Valves are shut.

When an abnormal sound is heard over a valve, that should be open, it is called **obstructive**, when over a valve that should be shut, it is called **regurgitative**.

Each Auricle has 5 openings. Each Ventricle has 2 openings.

Openings of the Right Auricle.

- 5 { 1st, for the Superior Vena Cava.
- 2nd, for the Inferior Vena Cava.
- 3rd, for the Coronary Sinus.
- 4th, Foramina Thebesii,
- 5th, Auriculo-Ventricular Opening.

Openings of the Left Auricle :

- 5 { 4 Openings for the 4 Pulmonary Veins.
- Auricular-Ventricular Opening.

Openings of the Right Ventricle :

- 2 { 1st, Auriculo-Ventricular Opening.
- 2nd, Opening for the Pulmonary Artery.

Openings of the Left Ventricle :

- 2 { 1st, Auriculo-Ventricular Opening.
- 2nd, Opening for the Aorta (situated behind the Mitral Valve.)

The Heart corresponds to the following boundaries : **above**, to a line drawn horizontally between the 2nd and 3rd costal cartilages; **below**, to a line drawn horizontally between the 5th and 6th ribs; **on the right side**, to a line drawn vertically about $1\frac{1}{2}$ inches from the median line; **on the left side**, to a line drawn vertically about 3 inches from the median line.

It is surrounded by a serous membrane (shut sac) called **Pericardium**.

N. B.—There are 5 serous membranes in the female, and 7 serous membranes in the male.

In the female :

5 { Arachnoid in the Cranial Cavity.
2 Pleurae,
Pericardium, } in the Thoracic Cavity.
Peritoneum in the Abdominal “

In the male :

7 { The above named 5, and the
2 Tunica Vaginales in the Testes.

The Heart has 6 valves : 4 of those (Mitral, Tricuspid and 2 Semilunar Valves) have to do with the general circulation, as we have seen above. The other two, the Eustachian Valve and the valve for the Foramina Thebesii, have only to do with the local current.

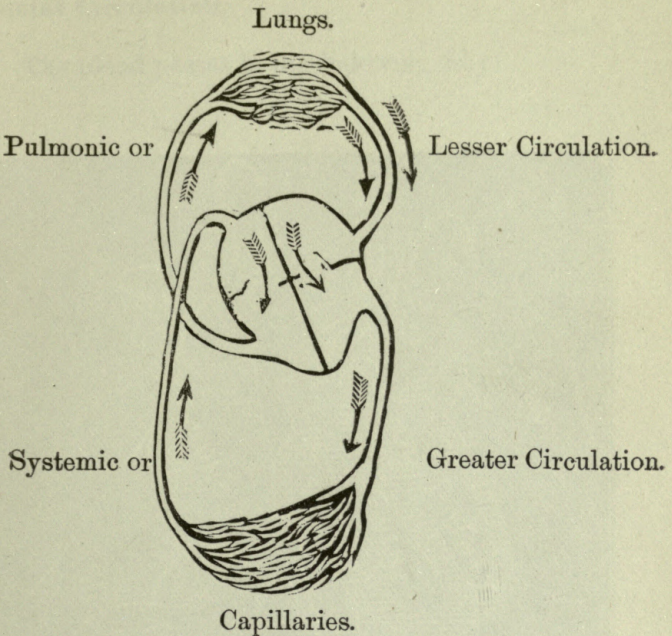
The Circulation of the Blood takes place in the following order : The venous blood of the body passes through the **Superior** and **Inferior Vena Cava** and Coronary Sinus into the **Right Auricle**. From here into the **Right Ventricle**, then through the **Pulmonary Artery** to the **Lungs**. Here the blood becomes arterialized, and goes by means of the Pulmonary Veins to the **Left Auricle**, thence through the Auriculo-Ventricular Opening to the **Left Ventricle**, then through the **Aorta** and all the arteries to the **Capillaries**, and is then collected by the veins, which bring the blood, as we have seen in the beginning, back to the Right Auricle.

The General Circulation may be expressed in the word **Vavac**, (each letter of the word corresponding to an organ or vessel.)

General Circulation. { V—Veins,
A—R. Auricle,
V—R. Ventricle,
A—Pulmonary Artery,
C—Capillaries,

V—Pulmonary Veins,
A—L. Auricle,
V—L. Ventricle,
A—Aorta and Arteries,
C—Capillaries.

Then back to veins again in the same way as in the beginning.



There are in some parts of the body other more complicated circulations, as—

1st Portal Circulation. Here the blood passes through an extra set of Capillaries and Veins, namely, Portal Vein and the Capillaries of the Liver.

The Formula of it is, "Vavacvc," viz. :

VAVACVC {	V—Pulmonary Veins,
	A—L. Auricle,
	V—L. Ventricle,
	A—Aorta and Arteries,
	C—Capillaries,
	V—Portal Vein,
	C—Capillaries of the Liver.

VAVAC {	V—Hepatic Veins, Vena Cava Ascending,
	A—R. Auricle,
	V—R. Ventricle,
	A—Pulmonary Artery,
	C—Capillaries of the Lungs.

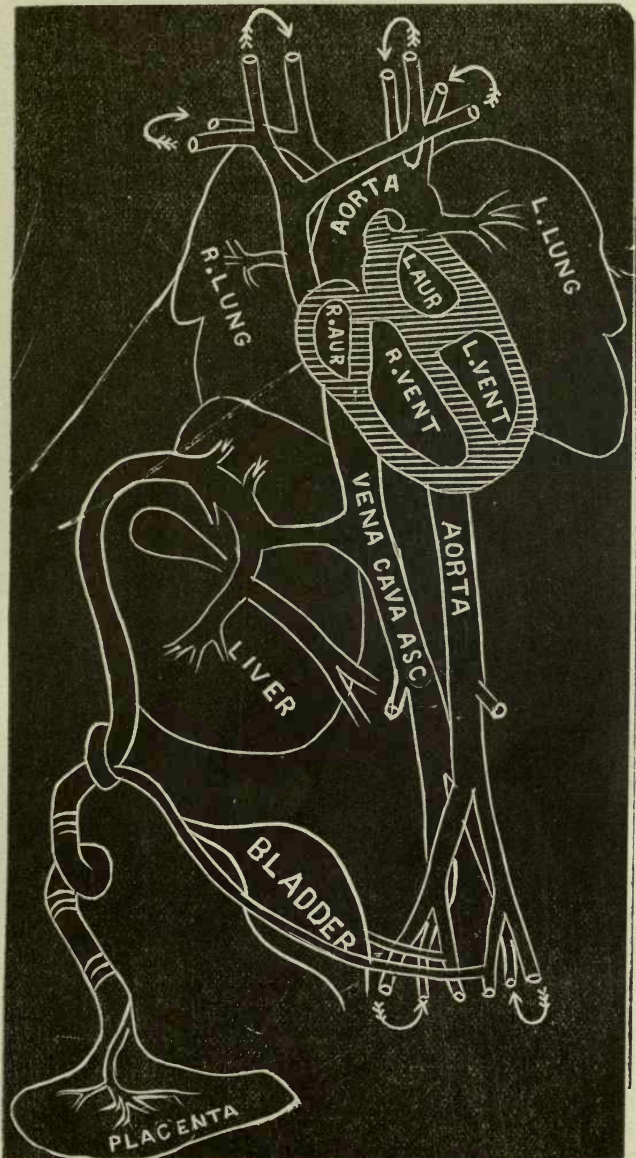
Then back to Pulmonary Veins again in the same order as stated.

2nd Cerebral Circulation. Here the blood passes through an extra set of sinusses and veins.

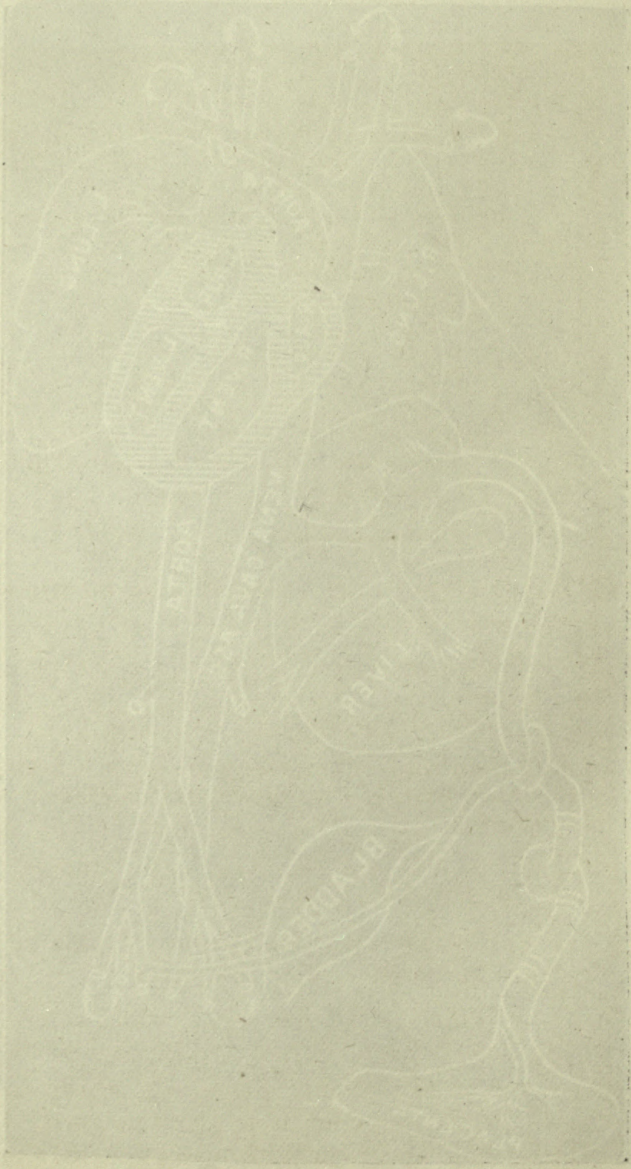
The Formula would be in this case, "Vavacvs."

3d Foetal Circulation.

The blood passes in the following way:



The bond passes in the following way:



Foetal Circulation.	}	Umbilical Arteries,
		Placenta,
		Umbilical Vein,
		Liver of the Child,
		Hepatic branches,
		Ductus Venosus,
		Ascending Vena Cava,
		Right Auricle,
		Left " "
		Left Ventricle,
		Aorta and Arteries of the Head and Upper
		Extremity,
		Capillaries of these parts,
		Veins of these parts, Vena Cava Descending,
		Right Auricle,
		" Ventricle,
		Pulmonary Artery,
		Lungs,
Ductus Arteriosus,		
Descending Part of Arch of Aorta,		
Thoracic and Abdominal Aorta,		
Internal Iliac Artery,		
Then back to Umbilical Arteries, in the or-		
der as stated.		

ARTERIES are Vessels which carry Arterial Blood.

Exceptions are :

Pulmonary Artery,	}	which carry
and in the foetus:		
Umbilical Arteries,		venous blood.

One other Definition is: Arteries are vessels which carry the blood in the direction from the Heart to the Capillaries.

An exception to this are the Coronary Arteries, which bring the blood to the Heart.

VEINS are Vessels which carry Venous Blood, and here we have the corresponding exceptions :

Pulmonary Veins, and	}	which carry
Umbilical Veins,		
		arterial blood.

Otherwise we can say : Veins are vessels which carry the blood in the direction from the Capillaries to the Heart; but here we have the exception, the Coronary Veins carrying the blood from the Heart.

The Largest Artery of the body is the **Aorta**.

The Aorta begins at the Left Ventricle of the Heart and goes to the lower border of the 4th Lumbar Vertebra. It is divided into 2 portions:

1st, Thoracic Aorta: { Arch of the Aorta,
 { Dorsal portion of the Aorta.

2nd, Ab^dominal Aorta.

The Arch of the Aorta extends from the origin of the Aorta to the lower part of the body of the 4th Dorsal Vertebra. It ascends behind the Sternum upwards and forwards to the right side, passes then transversely from right to left, and from before backwards to the left side of the 3rd Dorsal Vertebra, and descends then to the lower border of the 4th Dorsal Vertebra, where it takes the name of the Dorsal Portion of the Thoracic Aorta.

The Arch of the Aorta is divided into 3 parts:

1) Ascending Portion is about 2 inches in length. It passes obliquely upwards to the upper border of the 2nd costal cartilage on the right side. This portion of the arch is contained in the Pericardium.

Plan of Relations.

In Front:

Pulmonary Artery,
R. Auricular Appendix,
Pericardium,
Thymus Gland.

Right Side:

Sup. Vena Cava,
Right Auricle.



Left Side:

Pulmonary Artery,

Behind:

R. Pulmonary Vessels,
Root of Right Lung.

- 2) **Transverse Portion** commences at the upper part of the 2d Costo-Sternal Articulation at the right side, and goes to the 2d Dorsal Vertebra behind.

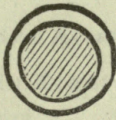
Relations.

Above :

Left Innominate Vein,
Arteria Innominata,
Left Carotid Artery,
Left Subclavian.

In Front :

Left Pleura and Lung,
“ Pneumogastric Nerve,
“ Phrenic Nerve,
Cardiac Nerves.



Behind :

Trachea,
Cardiac Plexus,
Oesophagus,
Thoracic Duct,
Left Recurrent Nerve,

Below :

Bifurcation of Pulmonary Artery,
Remains of Ductus Arteriosus,
Left Recurrent Nerve,
“ Bronchus.

- 3) **Descending Portion** goes from the 2d Dorsal Vertebra downwards to the lower border of the 4th Dorsal Vertebra.

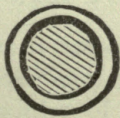
Relations.

In Front :

Pleura,
Root of Left Lung.

Right Side :

Oesophagus,
Thoracic Duct.



Left Side :

Pleura.

Behind :

Left side of 4th Dorsal Vertebra.

of the same kind as the other two, but the
the first of the three is the most
and the second is the most

the first of the three is the most
and the second is the most

the first of the three is the most
and the second is the most

the first of the three is the most
and the second is the most

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the first of the three is the most
and the second is the most

Branches of the Arch of the Aorta:

These are 5 in number:

- 1) The Right Coronary Artery, }
- 2) The Left “ “ “ }

These vessels nourish the heart, and are given off from the ascending portion of the Aorta.

- 3) Arteria Innominata,
- 4) Left Common Carotid Artery,
- 5) Left Subclavian Artery.

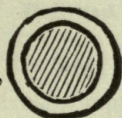
Relations of the Arteria Innominata.

In Front:

Sternum,
Sterno-Hyoid,
“ Thyroid,
Remains of Thymus Gland,
Left Innominate Vein,
Inferior Thyroid Veins,
Inferior Cervical Cardiac branch from the
Right Pneumogastric Nerve.

Right Side:

Right Vena Innominata,
“ Pneumogastric Nerve,
Pleura.



Left Side:

Remains of Thymus Gland,
Left Carotid.

Behind:

Trachea.

N.B.—The commencement of the Aorta may be distinguished from the beginning of the Pulmonary Artery by the presence of the 2 Coronary Arteries.

The Arteria Innominata arises from the commencement of the transverse portion of the Aorta, ascends obliquely to the upper border of the right Sterno-Clavicular Articulation, where it divides into the Right Common Carotid and the Right Subclavian Arteries. Its length varies from 1—2½ inches.

Left Common Carotid Artery commences from the highest part of the Arch of Aorta, passes obliquely upwards to a level with the upper border of the Thyroid Cartilage, where it divides into the External and Internal Carotid Arteries.

Relations of the Left Common Carotid Artery :

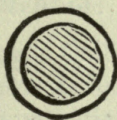
Thoracic portion :

In Front :

Sternum,
Sterno-Hyoid,
Sterno-Thyroid,
Left Innominate Vein,
Remains of Thymus Gland.

Internally :

Arteria Innominata,



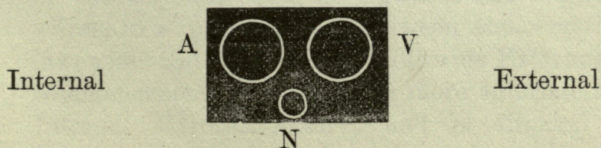
Externally :

Left Pneumogastric Nerve,
Left Subclavian Artery.

Behind :

Trachea,
Oesophagus,
Thoracic Duct.

The Com.Carotid Art. on either side of the neck is contained in a **sheath**, derived from the **Deep Cervical Fascia**, which also encloses the **Internal Jugular Vein** and the **Pneumogastric Nerve**. The vein lying on the outer side of the artery and the nerve between and behind the artery and vein.



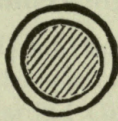
**Relations of the Common Carotoid Artery on either side ;
In the Neck :**

In Front :

Integument and Fascia,	Omo-Hyoid,
Platysma,	Descendens Noni Nerve,
Sterno-Mastoid,	Sterno-Mastoid Artery,
“ Hyoid,	Thyroid, Lingual and Facial
“ Thyroid,	Veins,
	Ant. Jugular Vein.

Externally :

Intern. Jugular Vein,
Pneumogastric Nerve.



Internally :

Trachea,
Thyroid Gland,
Recurrent Laryngeal Nerve
Infer. Thyroid Artery,
Larynx,
Pharynx.

Behind :

Longus Colli,
Rectus Anticus Major,
Sympathetic Nerve,
Infer. Thyroid Artery,
Recurrent Laryngeal Nerve.

The Right Common Carotid Artery begins at the end of the Arteria Innominata. It has therefore no thoracic portion, and is shorter than the Left Common Carotid. The Common Carotid Arteries do not give off any branches.

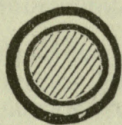
The External and Internal Carotid Arteries get their names, not from their position, but from their destination.

The External Carotid Artery goes from the upper border of the Thyroid Cartilage upwards and slightly backwards, to a space midway between the condyle of the lower jaw and the Meatus Auditorius Externus. At its commencement this artery is more internal than the Internal Carotid Artery, and is situated in the anterior superior triangle of the neck.

Relations of the External Carotid.

In Front :

Integument and Fascia,
Platysma,
Hypoglossal Nerve,
Lingual and Facial Veins,
Digastricus,
Stylo-Hyoid Muscle,
Parotid Gland,
Facial Nerve.



Behind :

Super. Laryngeal Nerve,
Stylo-Glossus,
Stylo-Pharyngeus,
Glosso Pharyngeal Nerve,
Parotid Gland.

Internally :

Hyoid Bone,
Pharynx,
Parotid Gland,
Ramus of Jaw.

Branches of the External Carotid Artery are 8 in number:

Anterior, 3 { Superior Thyroid,
Lingual,
Facial.

Posterior, 2 { Occipital,
Posterior Auricular.

Ascending, 1: Ascending Pharyngeal,

Terminal, 2: { Temporal,
Internal Maxillary.

Superior Thyroid Artery gives off the following branches :

Hyoid,
Superficial Descending,
(Sterno-Mastoid,)
Superior Laryngeal,
Crico-Thyroid.

Lingual Artery gives off:

Hyoid,
Dorsalis Linguae,
Sublingual,
Ranine.

Facial Artery gives off:

Cervical branches : { Inferior or Ascending Palatine,
Tonsillar,
Submaxillary.
Submental.

Facial branches : { Muscular,
Inferior Labial,
Inferior Coronary,
Superior “
Lateralis Nasi,
Angular.

Occipital Artery gives off the following branches :

Muscular,
Auricular,
Inferior Meningeal,
Arteria Principis Cervicis.

Posterior Auricular Artery gives off:

Stylo-Mastoid,
Auricular.

Ascending Pharyngeal Artery gives off:

Muscular branches,
Pharyngeal “
Meningeal “

Temporal Artery gives off:

Anterior Temporal,
Posterior Temp. : { Transverse Facial,
Middle Temporal,
Anterior Auricular.

Internal Maxillary Artery gives off the following 14 branches :

Maxillary portion, 4 : { Tympanic,
Middle Meningeal,
Small “
Inferior Dental.

Pterygoid portion, 4 : { Deep Temporal,
Pterygoid,
Masseteric,
Buccal.

Spheno-Maxillary portion, 6 : { Alveolar,
Infraorbital,
Descending Palatine,
Vidian,
Pterygo-Palatine,
Nasal or Spheno-Palatine.

The two Internal Carotid Arteries and the two Vertebral Arteries nourish the brain.

The Internal Carotid Artery is divided into 4 portions, viz :
Cervical, Petrous, Cavernous and Cerebral portion.

Relations in the Cervical portion.

In Front :

Skin, Superficial and Deep Fascia,
Parotid Gland,
Stylo-Glossus,
Stylo-Pharyngeus,
Glosso-Pharyngeal Nerve.

Externally :

Internal Jugular Vein,
Pneumogastric Nerve.



Internally :

Pharynx,
Ascend. Pharyngeal Art.
Tonsil.

Behind :

Rectus Anticus Major,
Sympathetic Nerve,
Sup. Laryngeal Nerve.

Internal Carotid Artery commences at the bifurcation of the Common Carotid Artery, opposite the upper border of the Thyroid Cartilage, runs upwards to the Carotid Foramen in the Petrous portion of the Temporal, passes through the Carotid canal, curves upwards to the Anterior Clinoid Process, where it pierces the Dura Mater, and divides into its terminal branches.

Branches of the Internal Carotid Artery :

In the Petrous portion : Tympanic,

In the Cavernous portion : { Arteriae Receptaculi,
Anterior Meningeal,
Ophthalmic.

In the Cerebral portion : { Anterior Cerebral,
Middle Cerebral,
Posterior Communicating,
Anterior Choroid.

Branches of the Ophthalmic Artery.

Orbital group :

Lachrymal,
Supraorbital,
Post. Ethmoidal,
Ant. Ethmoidal,
Palpebral,
Frontal,
Nasal.

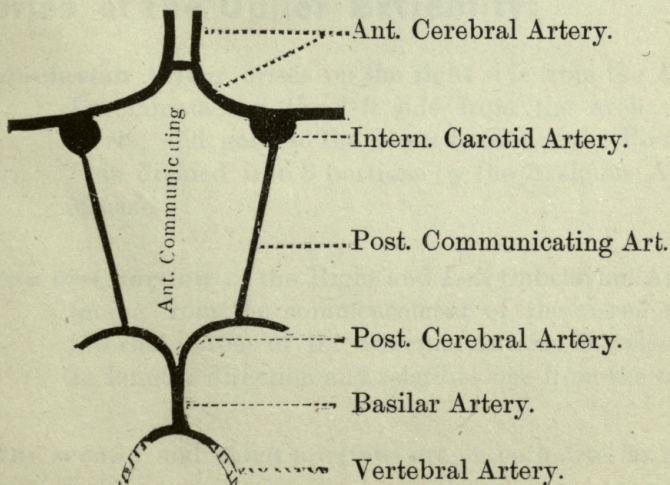
Ocular group :

Muscular,
Ant. Ciliary,
Short “
Long “
Arteria Centralis
[Retinae.

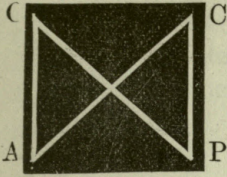
Arteries of the Base of the Brain :

At the Base of the Brain we have the Circle of Willis, the most perfect anastomosis between the branches of the 2 Vertebral and the 2 Intern. Carotid Art., which 4 vessels supply the brain with blood. The Circle of Willis is in reality more a pentagon than a circle.

Circle of Willis is formed by 5 pairs of Arteries :



In order to remember this take the word CAP, write the letters in the following way, and connect them with lines as the annexed figure shows.



C stands for Cerebral and Communicating.
A for Anterior.
P for Posterior.

The parts of the Brain included within the Circle of Willis are:

Lamina Cinerea,
Commissure of the Optic Nerves,
Infundibulum,
Tuber Cinereum,
Corpora Albicantia,
Posterior perforated space.

Arteries of the Upper Extremity:

Subclavian Artery arises on the right side from the Arteria Innominata; on the left side from the arch of the Aorta, and goes to the lower border of the First Rib. It is divided into 3 portions by the Scalenus Anticus Muscle.

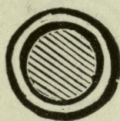
The first portion of the Right and Left Subclavian Arteries (going from the commencement of the vessel to the internal border of the Scalenus Anticus Muscle) differ in length, direction and relations one from the other.

The second and third portions are in both arteries alike.

Relations of the First Portion of the Right Subclavian Artery.

In Front :

Clavicular origin of Sterno-Mastoid Muscle,
Sterno-Hyoid and Sterno-Thyroid,
Internal Jugular and Vertebral Veins,
Pneumogastric, Cardiac and Phrenic Nerves.



Beneath :
Pleura.

Behind :

Recurrent Laryngeal Nerve,
Sympathetic,
Longus Colli,
Transverse process of the 7th Cervical
[Vertebra.

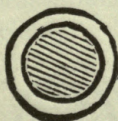
First portion of the Left Subclavian Artery.

In Front :

Pleura and Left Lung,
Pneumogastric, Cardiac & Phrenic Nerves,
Left Common Carotid Artery,
Left Intern. Jugular and Innominate Veins,
Sterno-Thyroid, Sterno-Hyoid,
Sterno-Mastoid.

Inner Side :

Oesophagus,
Trachea,
Thoracic Duct.



Outer Side :
Pleura.

Behind :

Oesophagus and Thoracic Duct,
Inferior Cervical Ganglion,
Longus Colli and Vertebral Column.

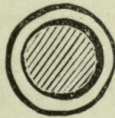
The second portion of the Subclavian Artery is the part situated behind the Scalenus Anticus Muscle.

Plan of Relations.

In Front.

Scalenus Anticus,
Phrenic Nerve,
Subclavian Vein.

Inner Side.
Brachial Plexus.



Outer Side.
Pleura.

Behind.

Pleura and Scalenus Medius.

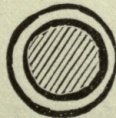
The third portion of the Subclavian Artery commences at the outer border of the Scalenus Anticus, and goes to the lower border of the First Rib, where the Artery becomes the Axillary Artery.

Plan of Relations.

In Front.

Cervical Fascia,
External Jugular Vein,
Suprascapular Vein,
Transverse Cervical Veins,
Descending branches of Cervical Plexus,
Subclavius Muscle,
Suprascapular Artery,
Clavicle.

Above :
Brachial Plexus,
Omo-Hyoid.



Below :
First Rib.

Behind :

Scalenus Medius.

Branches of the Subclavian Artery :

From the 1st portion : { 1. Vertebral,
2. Internal Mammary,
3. Thyroid Axis, { Inferior Thyroid,
Supra Scapular,
Transversalis Colli.

From the 2d portion : 4. Superior Intercostal.

The Vertebral Artery goes upwards, passes through the bony canal formed by the Vertebral Foramina of the 6 Upper Cervical Vertebra, winds backwards, pierces the Posterior Occipito-Atlantal Ligament and Dura Mater and enters the skull through the Foramen Magnum. It passes then in front of the Medulla Oblongata, and unites with the Vertebral Artery of the opposite side at the lower border of the Pons Varolii, to form the Basilar Artery.

Branches :

Cervical : { Lateral Spinal,
Muscular.

Cranial : { Posterior Meningeal,
Anterior Spinal,
Posterior "
Inferior Cerebellar.

Basilar Artery extends from the posterior to the anterior border of the Pons Varolii.

Branches : { Transverse,
Anterior Cerebellar,
Superior "
Posterior "

Branches of the Inferior Thyroid Artery :

Laryngeal,
Tracheal,
Oesophageal,
Ascending Cervical.

Branches of the Internal Mammary :

Comes Nervi Phrenici,
Mediastinal,
Pericardiac,
Sternal,
Anterior Intercostal,
Perforating,
Musculo-Phrenic,
Superior Epigastric.

The Internal Mammary descends behind the Clavicle to the inner surface of the anterior wall of the chest. At the interval between the 6th and 7th costal cartilages it divides into 2 branches: the Musculo-Phrenic and Super. Epigastric. The Super. Epigastric is at first behind the Rectus muscle, perforates then the sheath of this muscle, supplies it and anastomoses with the Deep Epigastric Artery from the External Iliac. This forms the longest Anastomosis in the body.

Branches of the Superior Intercostal Art :

Profunda Cervicis (which anastomoses with the Arteria Princeps Cervicis of the Occipital Artery [External Carotid]).

Intercostal branches.

Collateral Circulations :

- 1) Vertebral with the other Vertebral Artery,
- 2) “ “ “ 2 Internal Carotid (Circle of Willis).
- 3) **Internal Mammary** with the Deep Epigastric (External Iliac).
- 4) **Internal Mammary** (Anterior Intercostal branches with the Intercostals of Aorta ;
- 5) **Internal Mammary** (Comes Nervi Phrenici) with the Phrenic Art. of Aorta ;
- 6) **Internal Mammary** with the Short and Long Thoracic of the Axillary ;

- 7) **Internal Mammary** (Superior Epigastric) with its fellow on the other side ;
 - 8) **Inferior Thyroid Art.** with the Superior Thyroid and Inferior Thyroid of the other side ;
 - 9) **Inferior Thyroid Art.** (Laryngeal, Tracheal) with those of the other side and with the Bronchial Arteries ;
 - 10) **Inferior Thyroid Art.** (Ascending Cervical) with the Muscular of Vertebral Art ;
 - 11) **Supra-Scapular Art.** with Dorsal branches of Subscapular (Axillary) ;
 - 12) **Supra-Scapular Art.** (Supra-Acromial branch) with the Acromial Thoracic of Axillary ;
 - 13) **Supra-Scapular Art.** with the Posterior Scapular (continuation of Transversus Colli), and this with Subscapular of Axillary ;
 - 14) **Transversus Colli** (Poster. Scapular) with the Subscapular and posterior branches of the Intercostal Arteries ;
 - 15) **Superior Intercostal** with the Aortic Intercostals ;
 - 16) **Superior Intercostal** (Profunda Cervicis) with the Arteria Princeps Cervicis of the Occipital (External Carotid) ;
-

Axillary Artery commences at the lower border of the 1st rib and terminates at the lower border of the tendons of the Latissimus Dorsi and Teres Major muscle. It is divided into 3 portions by the Pectoralis Minor muscle.

1st Part.

Plan of Relations.

In Front.

Pectoralis Major,
Costo-Carocoid Membrane,
Subclavius,
Cephalic vein.

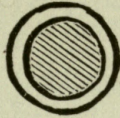
- 7) Internal Jugular Vein (Superior Epigastric) with its fellow on the other side.
- 8) Inferior Vena Cava with the Inferior Thyroid and Inferior Tarsal of the other side.
- 9) Inferior Thyroid Ar. (Laryngeal Tracheal) with those of the other side and with the Bronchial Arteries.
- 10) Inferior Thyroid Ar. (Ascending Cervical) with the Muscles of Vertebral Ar.
- 11) Superficial Ar. with Dorsal branches of Subscapular (Axillary).
- 12) Superficial Ar. (Superficial branch) with the Axillary Arteries & Axillary.
- 13) Superficial Ar. with the Posterior Scapular (continuation of Transverse Colla) and this with Subscapular (Axillary).
- 14) Transverse Colla (Posterior Scapular) with the Subscapular and posterior branches of the Inferior Arteries.
- 15) Superior Intercostal with the Axillary Intercostal.
- 16) Superior Intercostal (Prothoracic Cervical) with the Arteries Intercostales of the Cephalic (External Carotid).

Axillary Artery commences at the lower border of the 1st rib and terminates at the lower border of the tendon of the Latissimus Dorsi and Tarsal Major muscle. It is divided into 3 portions by the Pectoralis Minor muscle.

Portion of the Artery
In the
Pectoralis Major
Costo-Coracoid Membrane
Subclavian
Cephalic vein

Outer side.

Brachial Plexus.



Inner side.

Axillary vein.

Behind.

First Intercostal space and muscle,
First Serration of Serratus Magnus,
Posterior Thoracic Vein.

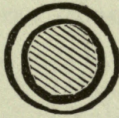
2d Part.

In Front.

Pectoralis Major,
“ Minor.

Outer side.

Outer cord of Brachial
Plexus.



Inner side.

Axillary Vein,
Inner Cord of Brachial
Plexus.

Behind.

Subscapularis,
Posterior cord of Brachial Plexus.

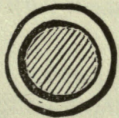
3d Part.

In Front.

Integument and Fascia,
Pectoralis Major.

Outer side.

Coraco Brachialis,
Median Nerve,
Musculo-Cutaneous Nerve.



Inner Front.

Ulnar Nerve,
Intern. Cutaneous Nerve,
Axillary Vein.

Behind.

Subscapularis,
Tendons of Latissimus Dorsi,
“ “ Teres Major,
Musculo-Spiral Nerves,
Circumflex Nerve.

Inner side
Axillary vein



Outer side
Brachial Plexus

First intercostal space and muscle
First division of Nervous System
Posterior Thoracic Vein

Section at A1, showing the division of the Axillary Vein into the Brachial Vein and the Cephalic Vein. The Brachial Vein is shown passing deep to the Pectoralis Major muscle, and the Cephalic Vein is shown passing deep to the Pectoralis Minor muscle. The diagram is labeled with 'Inner side' and 'Outer side'.

Inner side
Axillary Vein
Inner Cord of Brachial Plexus



Outer cord of Brachial Plexus
Outer side

Subscapularis, Posterior
Posterior cord of Brachial Plexus

Diagram showing the division of the Axillary Vein into the Brachial Vein and the Cephalic Vein. The Brachial Vein is shown passing deep to the Pectoralis Major muscle, and the Cephalic Vein is shown passing deep to the Pectoralis Minor muscle. The diagram is labeled with 'Inner side' and 'Outer side'.

Diagram showing the division of the Axillary Vein into the Brachial Vein and the Cephalic Vein. The Brachial Vein is shown passing deep to the Pectoralis Major muscle, and the Cephalic Vein is shown passing deep to the Pectoralis Minor muscle. The diagram is labeled with 'Inner side' and 'Outer side'.

Inner side
Axillary Vein
Inner Cord of Brachial Plexus



Outer side
Brachial Plexus
Outer Cord of Brachial Plexus

Diagram showing the division of the Axillary Vein into the Brachial Vein and the Cephalic Vein. The Brachial Vein is shown passing deep to the Pectoralis Major muscle, and the Cephalic Vein is shown passing deep to the Pectoralis Minor muscle. The diagram is labeled with 'Inner side' and 'Outer side'.

Branches of the Axillary Artery.

- From 1st Part : { Superior Thoracic,
Acromial.
- From 2d Part : { Thoracica Longa,
" Alaris.
- From 3d Part : { Subscapular,
Anterior Circumflex,
Posterior "
-

Brachial Art. is the prolongation of the Axillary Art. It commences at the lower margin of the Teres Major muscle, and terminates about half an inch below the bend of the Elbow, where it divides into the Radial and Ulnar Arteries. The Art. runs along the inner border of the Coraco-Brachialis and Biceps muscle.

Branches.

- { Superior Profunda,
Nutrient Artery,
Inferior Profunda,
Anastomotica Magna,
Muscular.
-

The Superior Profunda { Interosseous Recurrent,
Art. anastomoses with { Posterior Ulnar,
Anastomotica Magna,
Inferior Profunda.

The Inferior Profunda { Poster. Ulnar Recurrent,
Art. anastomoses with { Anastomotica Magna.

The Anastomotica Magna { Superior Profunda,
Art. anastomoses with { Inferior "
Posterior Ulnar Recurrent,
Anterior " "

The Median Nerve is in front of the Brachial Art., in its upper 3-4. In the last 4th of the course of the Artery, the Nerve is situated inside to it.

branches of the Axillary Artery
The Brachial Plexus is formed by the union of the
Cervical and Thoracic Nerves
From 1st Part: Axillary Artery
From 2d Part: Axillary Artery
From 3d Part: Axillary Artery
From 4th Part: Axillary Artery
From 5th Part: Axillary Artery
From 6th Part: Axillary Artery
From 7th Part: Axillary Artery
From 8th Part: Axillary Artery
From 9th Part: Axillary Artery
From 10th Part: Axillary Artery

Brachial Art. is the continuation of the Axillary Art. It
commences at the lower margin of the Pectoralis Major
muscle and terminates about half an inch below the
head of the Humerus, where it divides into the Radial
and Ulnar Arteries. The Art. runs along the inner
border of the Coraco-brachialis and Biceps muscles.

Branches
Superior Profunda
Nutrient Artery
Inferior Profunda
Anastomosis Magna
Anastomosis Magna

Interosseous Nerve
The Superior Profunda
Art. anastomoses with
Inferior Profunda

The Inferior Profunda
Art. anastomoses with
Anastomosis Magna

Superior Profunda
The Anastomosis Magna
Art. anastomoses with
Inferior Profunda

The Median Nerve is in front of the Brachial Art. in its up-
per 3/4. In the last 1/4 of the course of the Artery,
the Nerve is situated inside of it.

The Bicipital Fascia separates the Brachial Art., opposite the Elbow from the Median Basilic Vein.

Radial Art. commences at the bifurcation of the Brachial Artery, and ends in the Deep Palmar Arch (union with the deep branch of Ulnar Artery) across the Metacarpal bones.

Branches :

In the Forearm :	{	Radial Recurrent, Muscular, Superficialis Volae, Anterior Carpal.
In the Wrist :	{	Posterior Carpal, Metacarpal, Dorsales Pollicis, Dorsalis Indicis.
In the Hand :	{	Princeps Pollicis, Radialis Indicis, Perforating, Interosseous.

Ulnar Artery : commences at the bifurcation of the Brachial, and ends by forming the **Superficial Palmar Arch** (uniting with the Superficialis Volae of the Radial Art.)

Branches :

In the Forearm :	{	Anterior Ulnar Recurrent, Poster " "
	{	Interosseous : { Anterior Interosseous { Posterior " "
	{	Muscular.
In the Wrist :	{	Anterior Carpal, Posterior " "
In the Hand :	{	Deep or communicating branch, Digital.

ARTERIES OF THE TRUNK.

- 1) **Arch of the Aorta** (see the beginning of the Arteries).
- 2) **Descending or Dorsal Portion** of the Thoracic Aorta commences at the lower border of the 4th Dorsal Vertebra on the left side, and terminates at the Aortic Opening of the Diaphragm.

Branches,

Pericardial,
Bronchial,
Posterior Mediastinal,
Intercostal.

3) **Abdominal Aorta** going from the Diaphragm to the left side of the 4th Lumbar Vertebra, where it divides into the two Common Iliacs.

Branches,

Phrenic
Coeliac axis, { Gastric,
 { Hepatic,
 { Splenic.
Superior Mesenteric,
Suprarenal,
Renal,
Spermatic,
Inferior Mesenteric,
Lumbar,
Sacra Media,

These branches may be divided into 3 sets :

Visceral { Coeliac Axis,
branches : { Superior Mesenteric,
 { Inferior “

Parietal { Phrenic,
branches : { Lumbar,
 { Sacra Media.

Branches supplying { Suprarenal,
the Genito-Urinary { Renal,
Organs : { Spermatic.

Branches of the Hepatic Artery.

Pyloric,
Gastro-Duodenalis,
Cystic.

Branches of the Splenic Artery.

Pancreaticae Parvae,
 “ Magnae,
Gastric (Vasa Brevia),
Gastro-Epiploica Sinistra.

Branches of the Superior Mesenteric Artery.

Inferior Pancreatico-Duodenalis,
Vasa Intestini Tenuis,
Ileo-Colic,
Colica Dextra,
“ Media.

At the left side of the body of the 4th Lumbar Vertebra the Abdominal Aorta divides into: **the Right and Left Common Iliac Arteries.** This point corresponds to the Umbilicus and is on a level with a line drawn from the highest point of one Iliac Crest to that of the other.

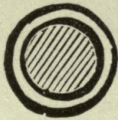
The Right Common Iliac Artery is longer than the left.

Relations of the Right Common Iliac Art.

In Front.

Peritoneum,
Small Intestine,
Sympathetic Nerves,
Ureter.

Outer Side.



Vena Cava,
Right Common Iliac Vein,
Psoas Magnus.

Behind.

Right and Left Common Iliac Veins.

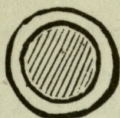
Relations of the Left Common Iliac Artery.

In Front.

Peritoneum,
Sympathetic Nerves,
Rectum
Superior Haemorrhoidal Artery,
Ureter.

Inner side.

Left Common Iliac Vein.



Outer side.

Psoas Magnus.

Behind.

Left Common Iliac Vein.

The Common Iliac Artery divides opposite the intervertebral substance between the last Lumbar Vertebra and the Sacrum into the **External and Internal Iliac Arteries.**

The **Internal Iliac Artery** divides at the upper margin of the Great Sacro-Sciatic Foramen into an anterior and posterior trunk.

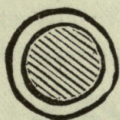
Relations.

In Front :

Peritoneum,
Ureter.

Outer Side :

Psoas Magnus,



Behind :

Internal Iliac Vein,
Lumbo-Sacral Nerve,
Pyriformis.

Branches of the Internal Iliac Artery :

From the Anterior Trunk :	{	Superior Vesical,	
		Middle “	
		Inferior “	
		Middle Haemorrhoidal,	
		Obturator,	
		Internal Pudic,	
		Sciatic,	
From the Posterior Trunk :	{	Uterine,	} in the female.
		Vaginal,	
		Gluteal,	
From the Posterior Trunk :	{	Ilio-Lumbar,	
		Lateral Sacral.	

Branches of the Internal Pudic Artery :

Inferior or External Haemorrhoidal,
Superficial Perineal,
Transverse “
Artery of the Bulb,
“ “ Corpus Cavernosum,
Dorsal Artery of the Penis.

The External Iliac Artery commences at the bifurcation of the Common Iliac and ends behind the middle of Poupart's Ligament, where it becomes the **Femoral Artery**.

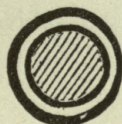
Relations of the: External Iliac Artery, near Poupart's Ligament :

In Front :

Peritoneum,
Intestine,
Iliac Fascia,
Spermatic vessels,
Genito-Crural Nerve,
Circumflex Iliac Vein,
Lymphatic vessels and glands.

Outer Side.

Psoas Magnus,
Iliac Fascia.



Inner Side.

External Iliac Vein,
Vas Deferens.

Behind :

External Iliac Vein,
Psoas Magnus.

Branches of the External Iliac Artery :

Epigastric,
Circumflex Iliac.

Femoral Artery commences behind the middle of Poupart's Ligament, and terminates at the opening in the Adductor Magnus Muscle, (at the junction of the middle with the lower third of the Thigh,) where it becomes the Popliteal Artery.

Branches :

Superficial Epigastric,
“ Circumflex Iliac,
“ External Pudic,
Deep External Pudic,
Profunda { External Circumflex,
 { Internal “
 { Three Perforating,
Muscular,
Anastomotica Magna.

The Femoral Vein lies in the upper part of the course of the Femoral Artery on the inside and the Anterior Crural Nerve on the outside of the Artery.

In the upper third of the Thigh, the Femoral Artery is very superficial, being covered by the Integument, Inguinal glands and the Superficial and Deep Fasciae.

See **Scarpa's Triangle**.

Popliteal Artery commences at the termination of the Femoral, and goes to the lower border of the Popliteus Muscle, where it divides into the Anterior and Posterior Tibial Arteries.

Branches :

Muscular { Superior,
 { Inferior,
Cutaneous,
Superior External Articular,
“ Internal “
Azygos Articular,
Inferior External Articular,

Anterior Tibial Artery commences at the bifurcation of the Popliteal, passes through the aperture at the upper part of the Interosseous Membrane, and descends on the anterior surface of it, to the front of the Ankle-joint, where it becomes the Dorsalis Pedis.

Branches:

Recurrent Tibial,
Muscular,
Internal Malleolar,
External Malleolar.

Dorsalis Pedis Art: the continuation of the Anterior Tibial, goes to the first interosseous space of the toes, where it divides into:

the Dorsalis Hallucis and
Communicating.

Branches:

Tarsal,
Metatarsal,
Interosseous,
Dorsalis Hallucis,
Communicating.

Poster. Tibial Art: commences at the lower border of the Popliteus Muscle, and ends in the fossa, between the inner Ankle and the Heel, where it divides into the Internal and External Plantar Arteries.

Branches:

Peroneal,
Anterior Peroneal,
Muscular,
Nutrient,
Communicating,
Internal Calcanean.

External Plantar Artery anastomoses with the communicating branch of the Dorsalis Pedis, thus completing the Plantar Arch.

Branches:

Posterior Perforating,
Digital,
Anterior Perforating.

N. B.—Different Meningeal Arteries :

Anterior Meningeal Artery	from the Internal Carotid,
Middle	“ “ } from the Internal Maxillary,
Small	“ “ }
Posterior	“ “ from the Vertebral Artery,
Inferior	“ “ “ “ Occipital,
Small	“ “ “ “ Ascending Pharyngeal Artery.

Different Thyroid Arteries :

Superior Thyroid from External Carotid,
 Middle “ or Crico-Thyroid from Superior
 Thyroid,
 Inferior Thyroid from Thyroid Axis.

Different Scapular Arteries :

Supra Scapular Artery from Thyroid Axis,
 Sub Scapular from Axillary,
 Posterior Scapular from Transversalis Colli,
 or from the Subclavian.

Different Intercostal Arteries :

Anterior Intercostal from Internal Mammary,
 Superior “ “ Subclavian,
 Dorsal “ “ Thoracic Aorta.

Different Epigastric Arteries :

Superior Epigastric from Internal Mammary,
 Superficial “ “ Femoral,
 Deep “ “ External Iliac.

Different Haemorrhoidal Arteries :

External or Inferior Haemorrhoidal from Internal
 Pudic,
 Middle Haemorrhoidal from Internal Iliac,
 Superior “ “ Inferior Mesenteric Artery.

Different Vesical Arteries:

Superior Vesical Artery is the part of the Foetal Umbilical Artery, which remains pervious after birth. It supplies the sides of the Bladder, and is the first branch of the Anterior Trunk of the Internal Iliac.

Middle Vesical Artery, usually a branch of the Superior supplies the base of the bladder.

Inferior Vesical Artery from the Anterior Trunk of the Internal Iliac, goes to the base of the Bladder.

The Arteries nourishing the long bones are of 3 kinds:

- 1) Periosteal Arteries going to the Periosteum.
- 2) Articular “ “ “ Ends of the bone.
- 3) Nutrient Artery “ “ Shaft or middle portion.

The Nutrient Artery of the Humerus is a branch of the Brachial Artery, and goes in the direction downwards.

The Nutrient Artery of the Radius and Ulna are branches of the Interosseous Artery going upwards.

The Nutrient Artery of the Femur is a branch of the Middle Perforating Artery of the Profunda, going upwards.

The Nutrient Artery of the Tibia and Fibula comes from the Posterior Tibial Artery, going downwards.

VEINS.

These are divided into Superficial and Deep Veins. The deep veins accompany the arteries, and are usually inclosed in the same sheath with those vessels.

The smaller veins as the Radial, Ulnar, Tibial, Peroneal exist generally in pairs, lying on each side of the corresponding Artery and are called: **Venae Comites.**

The veins have generally the same names as the arteries, which they accompany.

N. B.: Different Jugular Veins:

External Jugular Vein,
Posterior External Jugular,
Anterior Jugular,
Internal or Deep Jugular.

The Internal Jugular Vein commences at the Jugular Foramen, and receives the blood from the Lateral and Inferior Petrosal Sinuses. This vein lies in the Neck in the same sheath with the Com. Carotid Art., and Pneumogastic Nerve. The vein is externally to the artery and the nerve posteriorly between both. In front to the sheath, which is formed by the Deep Cervical Fascia are situated the

Descendens Noni Nerve } or better { Desc. Duodecimi N.
and Communicans Noni Nerve } called { Comm. “

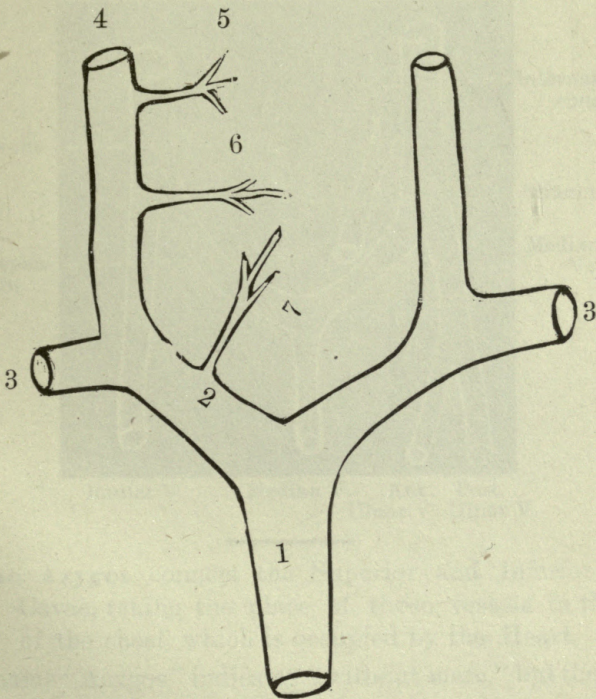


The Internal Jugular Vein unites with the Subclavian Vein to form the Vena Innominata. There are **2 Venae Innominatae** a Right and a Left one. The left one is longer than the right. The 2 Venae Innominatae join on the right side and anterior to the arch of the Aorta, just behind the upper border of the Sternum to form the **Vena Cava Superior** or Descendens.

The Vertebral Vein commences in the occipital region from the deep muscles of the neck, enters the Vertebral Foramen in the Atlas and descends down the bony canal along the Vertebral Artery and terminates in the Innominate Vein.

There are **3 Thyroid Veins**:

- 1) Superior Thyroid Vein bringing the blood to the Internal Jugular.
- 2) Middle Thyroid Vein bringing the blood to the Internal Jugular.
- 3) Inferior Thyroid Vein bringing the blood to the Right Innominate Vein.



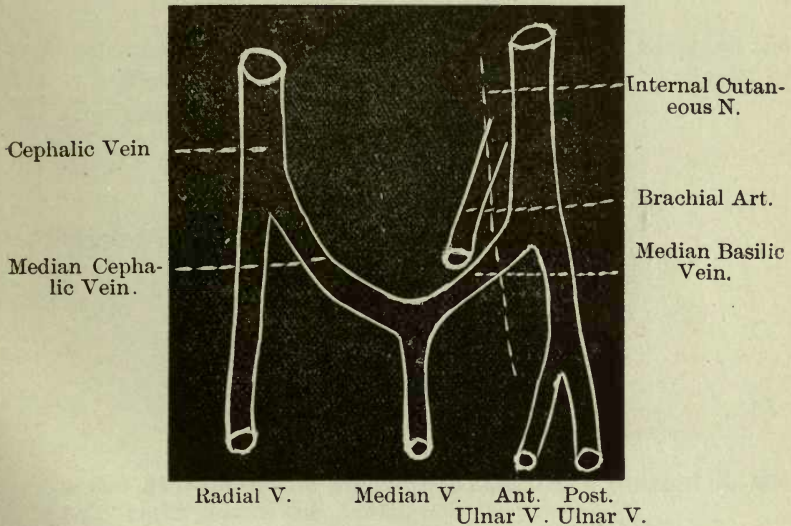
1. Vena Cava Superior.
2. Innominate Vein.
3. Subclavian Vein.
4. Internal Jugular Vein.
5. Superior Thyroid Vein.
6. Middle “ “
7. Internal “ “

In the Upper Extremity we have the :

Anterior Ulnar Vein } both forming Basilic vein.
Posterior “ “ }
Radial Vein,
Cephalic Vein,
Median Basilic Vein,
“ Cephalic Vein.

In bleeding do not open the Median Basilic Vein, but the Median Cephalic, otherwise you may easily injure the Internal Cutaneous Nerve and the Brachial Artery.

Basilic Vein:



Venae Azygos connect the Superior and Inferior Venae Cavae, taking the place of those vessels in the part of the chest, which is occupied by the Heart.

The name “Azygos” indicates “without mate,” but there are 2 Venae Azygos :

The Larger or Right Azygos Vein commences opposite the Second Lumbar Vertebra, by a branch from the Right Lumbar Vein. It passes through the Aortic Opening of the Diaphragm along the Vertebral Column to the 3d Dorsal Vertebra, and terminates in the Superior Vena Cava. It takes up the venous blood of the Intercostal Veins and carries it to the Superior Vena Cava.

The Smaller or Lesser Azygos Vein is on the left side, it commences by a branch from one of the Lumbar Veins, goes through the Left Crus of the Diaphragm to the 6th or 7th Dorsal Vertebra, and terminates in the Right Azygos Vein.

Portal Vein is formed by :

the Inferior Mesenteric Vein,	
Superior “ “	} join at first.
Splenic Vein,	
Gastric “	

It is about 4 inches in length, and enters the Liver at the Transverse Fissure, surrounded by the Capsule of Glisson.

(See : Liver.)

Veins of the Heart are :

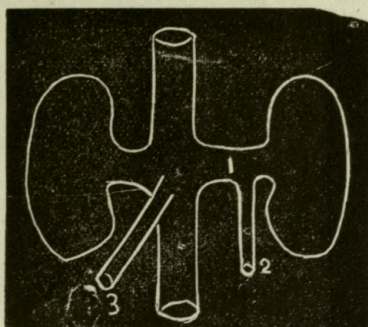
Great Cardiac Vein,
Posterior Cardiac Vein,
Anterior “ “
Venae Thebesii.

In the Abdomen the Vena Cava Inferior is situated on the right side of the Aorta.

The Right Common Iliac Vein crosses the Right Common Iliac Artery posteriorly, so that the Right External Iliac Vein, the Right Femoral Vein, etc. are on the left side of their corresponding arteries. On the left side the position of these veins is unchanged to the right side of the arteries.

The Right Spermatic Vein is shorter than the left, and enters the Inferior Vena Cava. The Left Spermatic Vein passes behind the Sigmoid Flexure of the Colon, and enters the left Renal Vein. The venous blood of this region on the left side has to pass a longer way than that on the right, and has to make two right angles,

at the same time it is hindered in its flow by the Sigmoid Flexure, full of faeces. These are the reasons for the frequent occurrence of Varicocele on the left side.



1. Renal ~~Artery~~. *Vein*.
 2. Left Spermatic ~~Artery~~. *Vein*.
 3. Right Spermatic ~~Artery~~. *Vein*.
-

NEUROLOGY.

The Nervous System of Animal Life consists of 2 principal parts, viz :

- 1) **A Central portion** called : the **Cerebro-Spinal Axis.**
- 2) **A peripheral portion** consisting of **Ganglions and Nerves.**

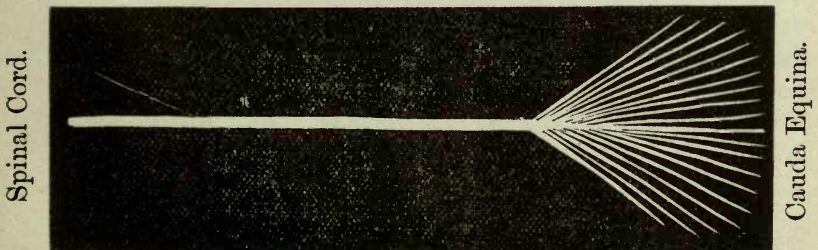
The Cerebro-Spinal Axis is conventionally divided into 5 parts, viz :

Cerebrum,	} called :	Encephalon or Brain.
Cerebellum,		
Pons Varolii,,		
Medulla Oblongata,		
Medulla Spinalis.		

Of these 5 parts the first 4 are nearly contained within the cavity of the Cranium, and when taken collectively are called : the **Encephalon** or Brain.

The Encephalon extends to the upper border of the Atlas or First Cervical Vertebra.

The Medulla Spinalis or Spinal Cord extends from the plane of the upper border of the Atlas to the lower part of the first or upper part of the 2d Lumbar Vertebra, where it terminates by dividing into a band of nerves, called : **Cauda Equina.**



In order to remove the Brain, the following structures must be divided and nearly in the following order.

- 1st **Scalp,**
- 2d **Calvaria** and the 2 Temporal muscles,
- 3d the 3 membranes, or the **Meninges of the Brain.**
- 4th the **Cranial Nerves.**

5th the **4 Arterial Trunks.**

6th the **Cerebral Veins and Sinuses.**

7th **Medulla Oblongata** at its point of junction with the Spinal Cord.

The Nerves proceeding from the Cerebro-Spinal Axis, are 43 pairs in number. These are

1) Cranial—12 pairs.

2) Spinal—31 pairs, { 8 Cervical Nerves,
12 Dorsal “
5 Lumbar “
5 Sacral “
1 Coccygeal “

43 pairs.

The Brain is surrounded or enveloped by 3 membranes. called : **Meninges.**

3 { Dura Mater, the most external,
Arachnoid, the middle,
Pia Mater, the most internal.

The Dura Mater is a fibrous membrane, and serves to protect the Brain and the cranial bones, to separate the different portions of the Brain by processes, to form sinuses for the passage of venous blood, and to afford a sheath for the Cranial Nerves (5 functions).

B.—The veins enter the sinuses in the direction against the flow of blood.

The processes of the Dura Mater are:

1) **The Tentorium Cerebr^{um}**, which is horizontal, separating the Cerebrum from the Cerebellum, and which so takes off the pressure of the Cerebrum from the Cerebellum and Medulla Oblongata.

On the 1st of April 1901,
the 1st of April 1901,
the 1st of April 1901,
the 1st of April 1901.

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the 1st of April 1901,
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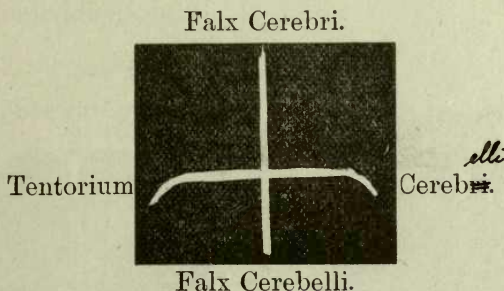
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- 2) **The Falx Cerebri**, which separates the two Hemispheres of the Cerebrum.
- 3) **The Falx Cerebelli**, which separates the two Hemispheres of the Cerebellum.



The Arachnoid is a serous membrane, and serves to facilitate motion. This membrane does not enter the ventricles of the brain.

The Pia Mater is a vascular membrane, and serves to nourish the Brain, particularly the gray mass. It dips down between the convolutions, and forms the Velum Interpositum and the choroid plexus of the 4th ventricle.

The Brain weighs about 44–50 ounces, the maxima being 34 and 65 ounces. The brain of Idiots seldom weighs more than 23 ounces. Its comparative weight to the whole body is about 1-40. The Brain receives about 1-5 of the blood of the whole body; therefore 8 times more in proportion as other parts normally do.

BRAIN.

The Brain consists of 4 parts: Cerebrum, Cerebellum, Pons Varolii and Medulla Oblongata.

The Upper Surface of the Brain presents in the median line a deep fissure, the “**Longitudinal Fissure**,” (in which is situated the Falx Cerebri and the branches of the Anterior Cerebral Artery) and to either side the

The brain is a soft, pulpy mass, and is covered by a thin, transparent membrane, the pia mater. It is situated in the cranial cavity, and is surrounded by the meninges. The brain is divided into two halves, the right and left hemispheres, by a deep fissure, the longitudinal fissure. Each hemisphere is further divided into four lobes, the frontal, parietal, temporal, and occipital lobes. The brain is also divided into two main parts, the cerebrum and the cerebellum. The cerebrum is the larger part, and is responsible for most of the higher functions of the brain. The cerebellum is the smaller part, and is responsible for the coordination of movement and balance.



Fig. 1. The Brain.

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BRAIN.

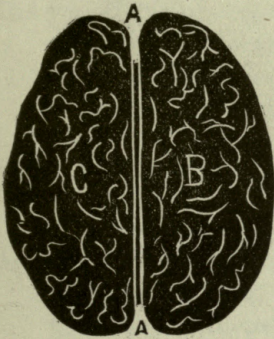
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two Hemispheres of the Cerebrum. On these hemispheres we see a number of convoluted eminences (convolutions) and between these depressions (sulci) of various depths, some to about 1 inch. The number and extent of the convolutions as well as their depth stand in close relation to the intellectual power of the individual.

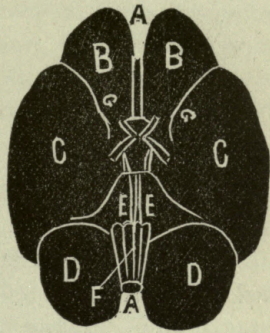
BRAIN.

Upper surface.



A. Longitudinal Fissure,
B C. Right & Left Hemispheres.

Lower surface.



A. Longitudinal Fissure.
B. Anterior Lobe.
C. Middle Lobe.
D. Posterior Lobe.
E. Pons Varolii.
F. Medulla Oblongata.
G. Fissure of Sylvius.

The Under Surface of the Brain is divided into 3 lobes on each side of the median line. **The Anterior Lobe** is separated from the Middle by the Fissure of Sylvius and the Posterior Lobe is situated above the Cerebellum.

In the Fissure of Sylvius is situated the Middle Cerebral Artery, and at its bottom some convolutions aggregating together, known as the **Island of Reil**.

The different subjects seen on the Under Surface of the Cerebrum are :

Longitudinal Fissure,
Corpus Callosum and its Peduncles,
Lamina Cinerea,
Olfactory Nerve,

Fissure of Sylvius,
Anterior Perforated Space,
Optic Commissure,
Tuber Cinereum,
Infundibulum,
Pituitary Body,
Corpora Albicantia,
Posterior Perforated Space,
Crura Cerebri.

The two Hemispheres of the Cerebrum connect together by means of the **Corpus Callosum**, (which forms therefore the bottom of the Longitudinal Fissure) and form 2 prolongations downwards to the Spinal Cord, called: **Crura Cerebri**.

In the Crura Cerebri between the superficial and deep layer of fibres is a mass of gray matter called: **Locus Niger**. As the Crura Cerebri enter the Hemispheres, they diverge from one another, so as to leave an interval between them, the **Interpeduncular Space**. The component fibres of each crus pass through two large masses of gray matter called: **Thalamus Opticus** and **Corpus Striatum**, which project as rounded eminences from the upper and inner side of each peduncle. The interval left between the upper surface of the Ganglia and under surface of the Corpus Callosum forms the General Ventricular Cavity.

There are 5 Ventricles (cavities) in the Brain.

2 Lateral Ventricles (1st and 2d.)

3d Ventricle.

4th “

5th “

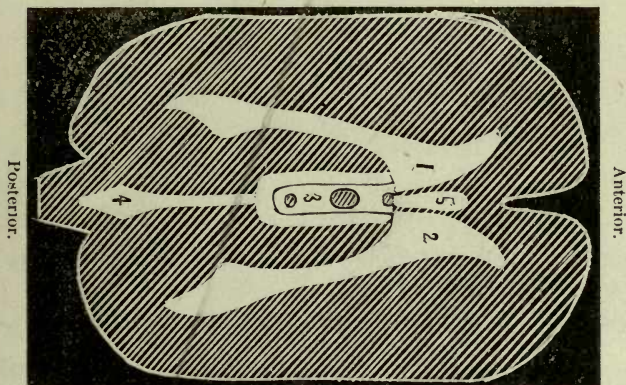
The upper part of the Ventricular Cavity is subdivided into 2 portions (lateral ventricles) by a vertical septum, “**Septum Lucidum**.”

The lower part of the Ventricular Cavity forms the 3d Ventricle, which is separated from the Lateral Ventricles by the **Fornix**, and which communicate with

the lateral ventricles above, by the **Foramen of Monro** on either side, and by the **Aqueduct of Sylvius** or **Iter a tertio ad quartum ventriculum** with the 4th ventricle behind.

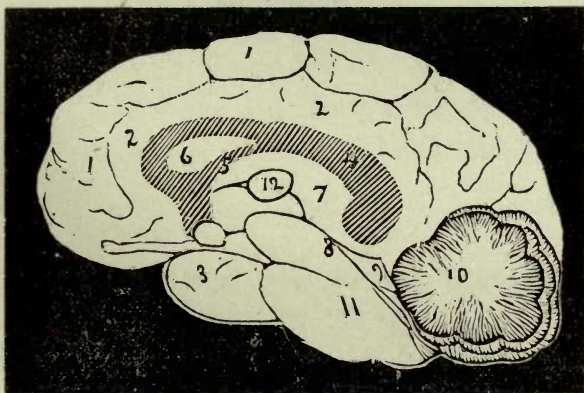
The **5th Ventricle** is the interval left between the two layers composing the **Septum Lucidum**.

Horizontal Section through the Brain.



- 1, 2.—Lateral Ventricles.
- 3.—3d Ventricle.
- 4.—4th Ventricle with Iter a tertio ad quartum ventriculum.
- 5.—5th Ventricle.

Vertical Section through the Brain in the median line.



- | | |
|--------------------------|---|
| 1—Marginal Convolutions. | 7—3d Ventricle. |
| 2—Gyrus Fornicatus. | 8—Iter a tertio ad quartum Ventriculum. |
| 3—Uncinate Gyrus. | 9—4th Ventricle. |
| 4—Corpus Callosum. | 10—Cerebellum. |
| 5—Fornix. | 11—Pons Varolii. |
| 6—Septum Lucidum. | 12—Middle Commissure of 3d Ventricle. |

Each **Lateral Ventricle** consists of a central cavity and 3 cornu, an anterior, posterior and descending.

Its boundaries are :

above :—Corpus Callosum.

below :—Corpus Striatum,
Taenia Semicircularis,
Thalamus Opticus,
Choroid Plexus,
Corpus Fimbriatum,
Fornix.

laterally to the median line :
Septum Lucidum.

The 3rd Ventricle is the space in the median line between the two Optic Thalami. It contains 3 transverse commissures called : the anterior, middle and posterior.

Its boundaries are :

above :—Fornix,
Velum Interpositum (a prolongation of
the Pia Mater.)

below :—Lamina Cinerea.
Tuber Cinereum,
Corpora Albicantia,
Locus Perforatus Posticus.

anterior :—Anterior Commissure.

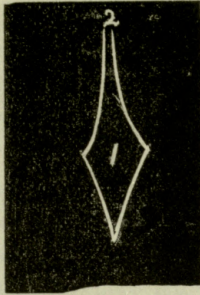
posterior :—Posterior Commissure.

The 4th Ventricle is a cavity situated between the Medulla Oblongata and the Cerebellum.

Its boundaries are :

above :—Iter a tertio ad quartum ventriculum,
Cerebellum,
Valve of Vieussens.

below :—Medulla Oblongata and Pons Varolii.



1.—4th Ventricle.

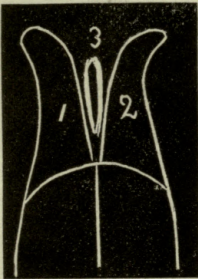
2.—Iter a tertio ad quartum ventriculum.

The 4th Ventricle communicates with the 3d Ventr. by the Iter a tertio ad quartum ventriculum or Aquaeduct of Sylvius.

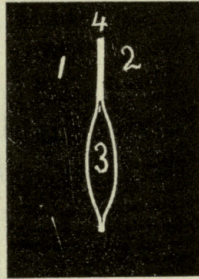
In the floor of this ventricle is a longitudinal fissure called: Calamus Scriptorius.

The 5th Ventricle is situated between and perfectly surrounded by the 2 layers of the Septum Lucidum.

Horizontal Section.



Vertical Section.



1, 2. Lateral Ventricles.

3. 5th Ventricle.

4. Septum Lucidum.

The Cerebellum is situated behind and below the Cerebral Hemispheres. It is divided into 2 lateral hemispheres by a longitudinal fissure. The outer portion of the Cerebellum consists of many fine layers or lamellae. The inner portion consists of a white nervous substance which appears on section like a tree, hence **arbor vitae**. In the trunk of this white mass we find a vesicular nerve-substance, called: the **Corpus Dentatum**.

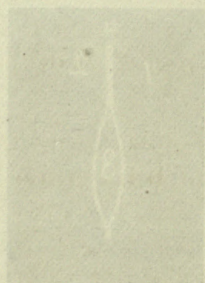
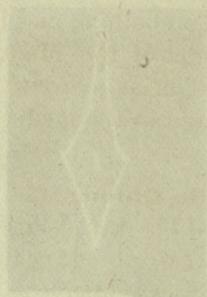


Fig. 1. Lateral view of the structure shown in Fig. 1.

The structure is a diamond-shaped structure, possibly a cross-section of a biological specimen, with a central vertical line and two diagonal lines forming the diamond shape. The structure is shown in a lateral view, and the drawing is a line drawing.

The Pons Varolii forms the great transverse commissure of the Cerebellum, and is situated behind the Crura and in front of the Medulla Oblongata. This is a large white mass, convex from side to side, and slightly grooved in the median line by the Basilar Artery.

The Medulla Oblongata is situated between the lower border of the Pons Varolii and the upper border of the Spinal Cord. It is about $1\frac{1}{4}$ inch in length, and is divided into 2 symmetrical halves by the Anterior Median Fissure, which is continuous with the anterior fissure of the Spinal Cord. On either side of the fissure is the **Anterior Pyramid** which is continuous with the anterior column of the cord. The two anterior pyramids decussate across the median fissure at the lower part of the Medulla.

From the Cerebro-Spinal Axis arise **12 pairs** of Cranial Nerves, *and 31 pairs of Spinal nerves; 43 pairs in all.*

A Cranial Nerve is a Nerve arising from the Cerebro-Spinal Axis, which leaves the cranial cavity by one or more foramina.

They are numerated from before backwards **in the order as they penetrate the Dura Mater** (not in the order as they arise).

The Cranial Nerves may be divided into 4 groups, according to their functions, viz:

A. Nerves of Special Sense:

1st or Olfactory for the sense of smell,
2d or Optic “ “ “ “ sight.
8th or Auditory “ “ “ “ hearing.
9th Glosso-Pharyngeal partially for taste.

B. Nerves of Sensation:

5th or Trifacial (its greater portion),
9th or Glosso-Pharyngeal, partial.

The Transverse Cervical foramen forms the most transverse commissure of the Cervical vertebrae, and is situated behind the Transverse process, and in front of the Medulla Oblongata. This is a large foramen, and is situated on the side, and slightly anterior to the middle line of the Cervical vertebrae.

The Vertebral Artery is situated between the lower part of the Transverse process and the upper border of the body of the vertebra. It is about 1/2 inch in length, and is situated in the middle of the vertebral column. It is situated in the middle of the vertebral column, and is situated in the middle of the vertebral column. It is situated in the middle of the vertebral column, and is situated in the middle of the vertebral column.

From the Transverse Cervical foramen, a branch of the Vertebral Artery, and 3/4 inch of spinal nerve, 1/2 inch in all.

A Cervical Nerve is a nerve which arises from the Cervical spinal ganglion, and is situated in the middle of the vertebral column. It is situated in the middle of the vertebral column, and is situated in the middle of the vertebral column. It is situated in the middle of the vertebral column, and is situated in the middle of the vertebral column.

The Cervical Nerve may be divided into 4 groups, namely: 1. The Cervical Nerve, 2. The Cervical Nerve, 3. The Cervical Nerve, 4. The Cervical Nerve.

1. Cervical Nerve. 2. Cervical Nerve. 3. Cervical Nerve. 4. Cervical Nerve. 5. Cervical Nerve. 6. Cervical Nerve. 7. Cervical Nerve. 8. Cervical Nerve. 9. Cervical Nerve. 10. Cervical Nerve.

11. Cervical Nerve. 12. Cervical Nerve. 13. Cervical Nerve. 14. Cervical Nerve. 15. Cervical Nerve. 16. Cervical Nerve. 17. Cervical Nerve. 18. Cervical Nerve. 19. Cervical Nerve. 20. Cervical Nerve.

C. Nerves of Motion :

3d or Motor Oculi,
4th or Pathetic,
5th or Trifacial, partial,
6th or Abducens,
7th or Facial,
12th or Hypo-Glossal.

D. Mixed Nerves :

10th or Pneumogastric,
11th or Spinal Accessory.

**List of the Cranial Nerves and the Foramina
of their exit.**

Willis.	Sommer- ing.	Name.	Foramen.
1	1	Olfactory.	Cribriform plate of
2	2	Optic.	[Ethmoid. Optic Foramen of Sphenoid
3	3	Motor Oculi.	Sphenoidal Fissure.
4	4	Patheticus.	do.
5	5	Trifacial,	
		1st division	do.
		2d “	Foramen Rotundum.
		3d “	“ Ovale.
6	6	Abducens.	Sphenoidal Fissure.
7 { Portio Dura.	7	Facial.	Meatus Auditorius Inter- [nus
7 { Portio Mollis	8	Auditory.	do. do.
8 {	9	Glosso-Pharyngeal	} Foramen Lacerum Pos- [terius.
	10	Pneumogastric	
	11	Spinal-Accessory	
9	12	Hypo-Glossal,	Ant. Condylloid Foramen.

The 1st or Olfactory Nerve goes to that portion of the Schneiderian Membrane (mucous membrane of the Nose,) which lines the Upper and Middle Meatus.

The 2d or Optic Nerve goes to the Retina of the Eye.

The 3d or Motor Oculi Nerve supplies the :

Levator Palpebrae,
Superior, }
Inferior, } Rectus,
Internal, }
Inferior Oblique.

The 4th or Patheticus Nerve supplies the

Superior Oblique, ~~and~~ *or*
Trochlearis Muscle.

The 5th or Trifacial or Trigeminus Nerve divides into 3 portions :

1st Division, or Ophthalmic Nerve supplies the Conjunctiva of the eye, Lachrymal gland, Upper Eyelid, integument of Cranium, mucous membrane and integument of the Nares.

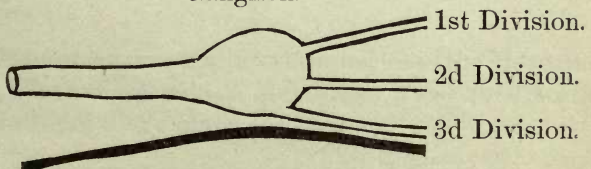
2d Division, or Superior Maxillary Nerve supplies all the muscles of the face between the eye and mouth with sensation.

3d Division, or Inferior Maxillary Nerve supplies the muscles and integument of the lower part of the face (teeth of the lower jaw, tongue, Parotid gland) with sensation and the muscles of mastication:

Temporal,
Masseter,
External, } Pterygoid, } with motor
Internal, } power.
Buccinator partly.

Gasserion
Ganglion.

Sensory Root
of 5th Cr. N.



Motor Root of 3d Division.

The Inferior Maxillary Nerve resembles a Spinal Nerve, because it is a compound nerve for motion and sensation. This Nerve supplies the Meatus Auditorius Externus, and at the same time the teeth of the lower jaw. Hence toothache will often be relieved by putting cotton with Tinct. Opii in the ear.

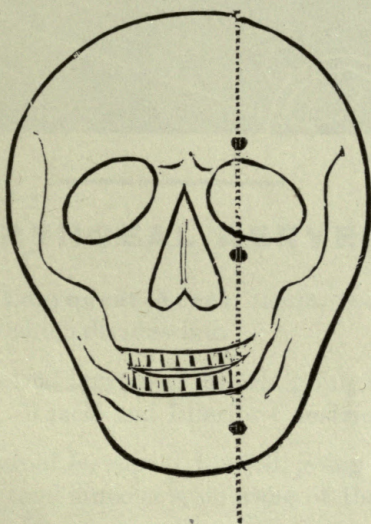
The Trifacial Nerve supplies the integument of the mouth, and at the same time the frontal sinuses, hence we often experience a peculiar sensation in the forehead, when we take cold drinks, etc.

The 3 divisions of the Trifacial Nerve make their exit from the bones of the face through 3 foramina, which are lying in one vertical line, viz :

Supra-orbital foramen,

Infra “ “

Mental foramen.



The 6th or Abducens Nerve supplies the Externus Rectus Muscle.

The 7th or Facial Nerve supplies the muscles of the Head and Face, Platysma Myoides, Membrana Tympani, Parotid and Sub-Maxillary gland,

The 8th or Auditory Nerve goes to the Labyrinth of the Internal ear.

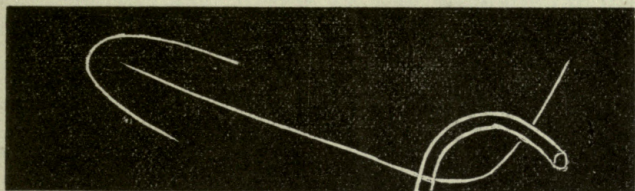
The 9th or Glosso-Pharyngeal Nerve goes to the Pharynx, Larynx, Trachea, Oesophagus, Lungs and Stomach.

The 10th or Pneumogastric Nerve goes to the Pharynx, Larynx. Lungs, Heart and Stomach.

The 11th or Spinal-Accessory Nerve supplies the Sterno-Mastoid and Trapezius Muscle.

The 12th or Hypo-Glossal Nerve goes to the muscles of the tongue (to the depressors of the Os-Hyoideus and Larynx).

N. B. The Occipital Artery curves around the Hypoglossal Nerve in the neck.



LARYNGEAL NERVES.

1) Superior Laryngeal Nerve (from the Pneumogastric Nerve), which divides into :

external laryngeal branch, going to Crico-Thyroid Muscle and Inferior Constrictor. and

internal laryngeal branch, going to Arytenoideus and mucous membrane of the Larynx.

2) Inferior or Recurrent Laryngeal Nerve (from the Pneumogastric Nerve) is the motor nerve of the Larynx: it supplies all the muscles of the Larynx, except the Crico-Thyroid. The Inferior or Recurrent Laryngeal Nerve winds on the left side around the arch of the Aorta. Hence in Aneurism of the Arch the functions of this nerve will be impaired (we have loss of voice, etc.).

NERVES OF RESPIRATION.

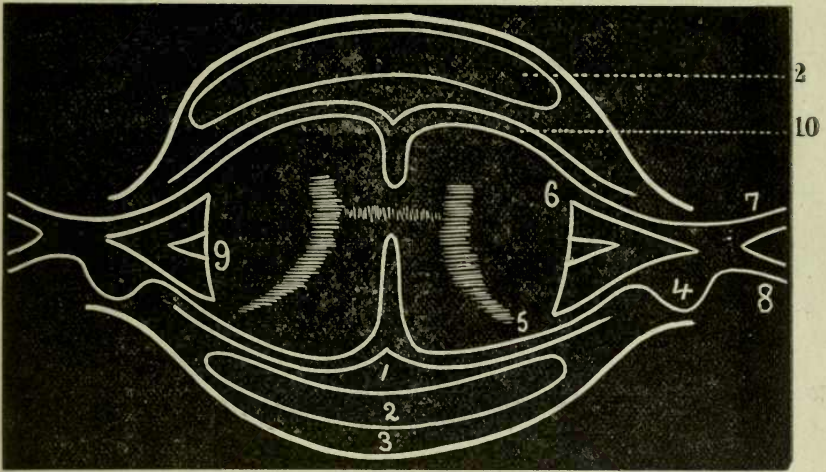
- 1) Excitor Nerves { Pneumogastric,
Cutaneous Nerves (reflex irritation).
 - 2) Motor Nerves { Superior Respiratory (Spinal Accessory)
Internal " (acting on the Diaphragm [Phrenic]),
External Respiratory or Long Thoracic
nerve (acting on the Serratus Magnus)
-

Medulla Spinalis or Spinal Cord commences at the upper border of the Atlas, and goes down through the Spinal Canal (inside of the Vertebrae) to the lower border of the 2d Lumbar Vertebra, where it terminates into the **Cauda Equina**. See page No. 354.

The Spinal Cord shows enlargements in the Cervical and Lumbar portion, where important nerves are given off. The Spinal Cord is in the same way as the Brain surrounded by **3 membranes** (having the same names as the Meninges of the Brain.) The difference between the Dura Mater of the Cord and that of the Brain, is: that the first one does not form the Periosteum of any bone, that it does not form any partition in the cord, and that it does not form any sinus.

Ligamentum Denticulatum is a continuation of the Pia Mater, forming a narrow fibrous band, situated on each side of the cord throughout its entire length and separating the anterior from the posterior roots of the spinal nerves.

The Arachnoid consists of 2 layers, which form a cavity, called: "the cavity of the Arachnoid." Between the visceral layer of the Arachnoid and the Pia Mater is the **Sub-Arachnoidal** space, which is filled with fluid (cerebro-spinal fluid), and which communicates with the venticular cavity of the Brain.



1. Subarachnoid space.
2. Cavity of Arachnoid.
3. Dura Mater.
4. Ganglion.
5. Posterior root.
6. Anterior root.
7. “ branch.
8. Posterior “
9. Ligamentum Denticulatum.
10. Pia Mater.

The Spinal Cord gives off 31 pairs of Spinal Nerves:

- | | |
|----------|------------------|
| 8 pairs— | Cervical Nerves. |
| 12 “ — | Dorsal “ |
| 5 “ | Lumbar “ |
| 5 “ | Sacral “ |
| 1 “ | Coccygeal “ |

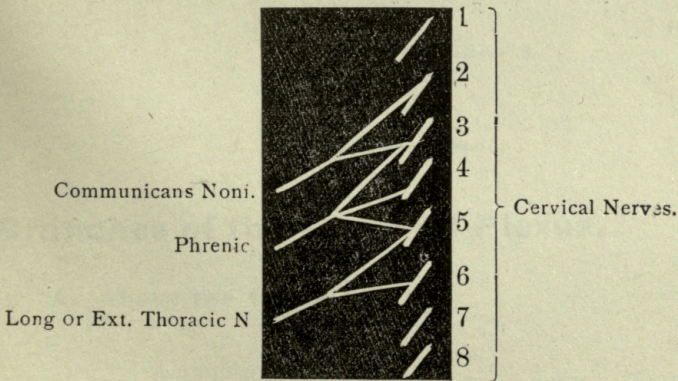
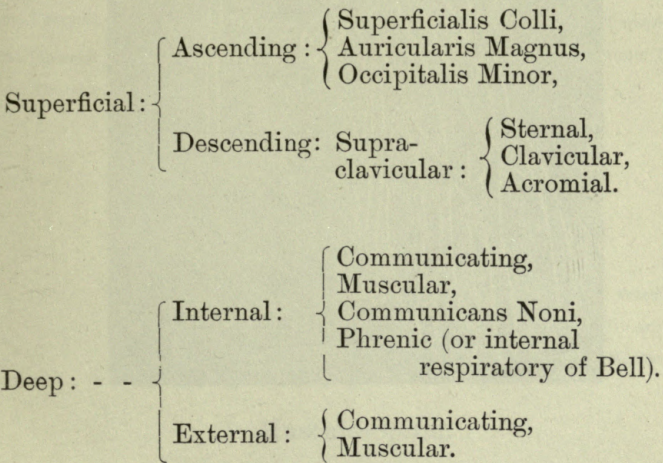
31 pairs.

Each Spinal Nerve arises by 2 roots, an Anterior or Motor Root, and a Posterior or Sensory Root. The posterior roots are larger than the anterior, and have a Ganglion. Immediately beyond the Ganglion, the 2 roots coalesce, and form one trunk. This trunk leaves the Spinal Canal by the Intervertebral Foramen, and divides into the anterior and posterior branches.

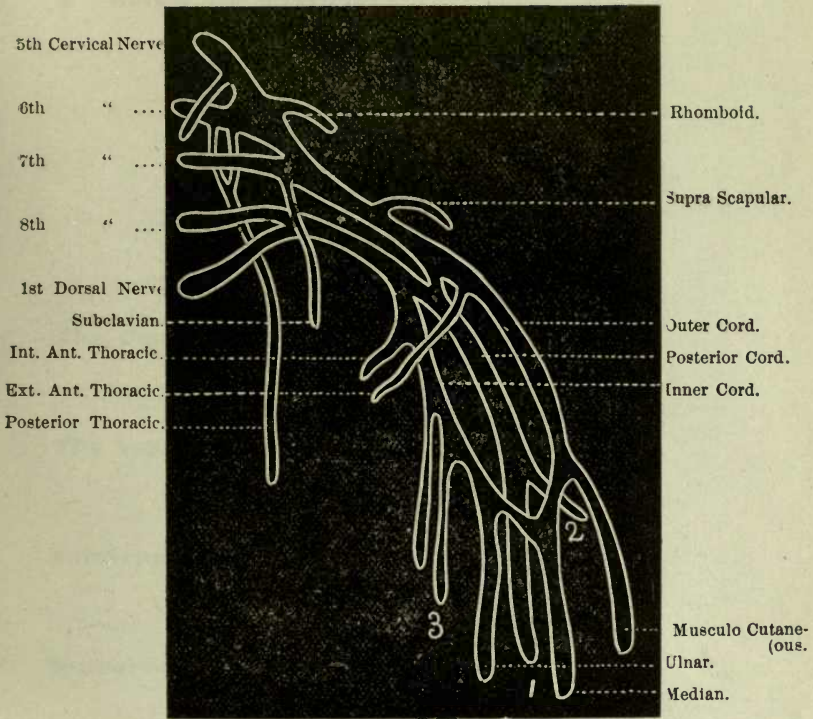
The Spinal Nerves form 4 large Plexuses.

- 1) **The Cervical Plexus** is formed by the anterior branches of the 4 upper Cervical Nerves. It is situated in front of the first 4 Cervical Vertebrae, resting on the Levator Anguli Scapulae and Scalenus Medius and is covered by the Sterno-Mastoid.

Branches :



- 2) **Brachial Plexus** is formed by the union of the anterior branches of the 4 lower Cervical and the first Dorsal Nerve. It extends from the lower part of the side of the Neck to the Axilla.

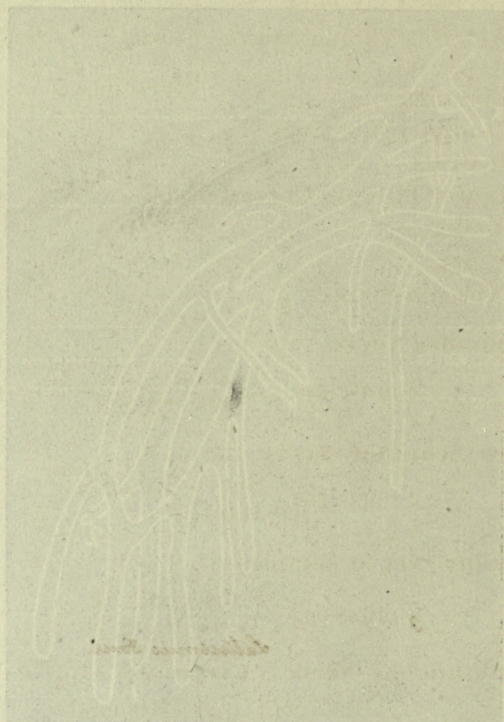


1. Musculo-Spiral,
2. Circumflex,
3. Internal Cutaneous.

Branches of the Brachial Plexus.

A. Above the Clavicle:

Communicating,
Muscular,
Posterior Thoracic or External Respiratory of Bell,
Supra Scapular.



1. Mammals-Spinal

2. Chondrichthyes

3. Inferior Osmichthyes

Branches of the Stachial Plexus

1. Above the Stachial

Commensal

Mammals

Notes on the History of the

Notes on the

B. Below the Clavicle :

Anterior Thoracic to the Chest,
 Supra Scapular, } to the Shoulder,
 Circumflex, }
 Musculo-Cutaneous,
 Internal “
 Lesser Internal Cutaneous,
 Median,
 Ulnar,
 Musculo-Spiral.

The Circumflex Nerve supplies

2 muscles : { Deltoid,
 Teres Minor,

The Supra Scapular Nerve supplies

2 muscles : { Supra Spinatus,
 Infra “

Sub-Scapular Nerve supplies

3 muscles : { Subscapularis,
 Teres Major.
Latissimus Dorsi

Musculo-Cutaneous Nerve (External) supplies :

3 muscles : { Coraco-Brachialis,
 Brachialis Anticus,
 Biceps.

Musculo Spiral or Internal Cutaneous Nerve supplies

5 muscles : { Triceps,
 Anconeus,
 Subanconeus,
 Supinator Longus,
 Extensor Carpi Radialis
 Longior.

Posterior Interosseous Nerve supplies :

14 muscles : { Extensor Carpi Radialis Brev.
 “ Com. Digitorum,
 “ Minimi Digiti,
 “ Carpi Ulnaris,
 Supinator Brevis,
 9 muscles : { Extensor Ossis Metacarpi [Pollicis,
 “ Primi Internodii [Pollicis,
 “ Secundi “ “
 “ Indicis.

Median Nerve supplies 11 muscles:

11 muscles:	8½ muscles:	Pronator Radii Teres, Flexor Carpi Radialis, Palmaris Longus, Flexor Sublimis Digitorum, Abductor Pollicis, Opponens " First and Second Lumbricales, ½ of the Flexor Brevis [Pollicis.
		Anterior Interosseous Nerve supplies: 2½ muscles: { Pronator Quadratus. Flexor Longus Pollicis. ½ of the Flexor Brevis Pollicis.

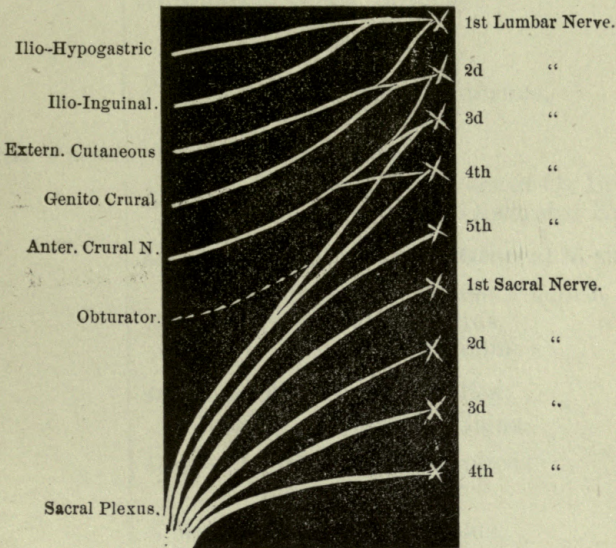
Ulnar Nerve supplies 16 muscles:

16 muscles:	1½ muscles:	Flexor Carpi Ulnaris, ½ of the Flexor Profundus [Digitorum.
		Superficial Palmar Nerve supplies: 1 muscle: { Palmaris Brevis.
	13½ muscles:	Deep Palmar Nerve supplies: Adductor Pollicis. Abductor Minimi Digiti. Flexor Brevis " " Opponens " " 3rd and 4th Lumbricales. 7 Interossei, ½ of the Flexor Brevis [Pollicis.

N. B.—**The Ulnar Nerve** rests at the Elbow upon the back of the inner condyle (between it and the Olecranon.) It passes into the Forearm between the 2 heads of the Flexor Carpi Ulnaris.

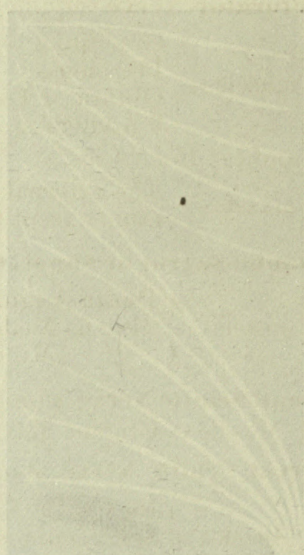
3. **The Lumbar Plexus** is formed by the anterior branches of the 4 upper Lumbar Nerves. It is situated in the Psoas Magnus in front of the transverse process of the Lumbar Vertebrae.

Branches:—Ilio-Hypogastric.
Ilio-Inguinal,
Genito-Crural,
External-Cutaneous,
Obturator,
Accessory Obturator,
Anterior Crural.



Sacral Plexus is formed by the Lumbo-Sacral and the anterior branches of the upper 4 Sacral Nerves. It rests upon the Piriformis and is covered by the Pelvic Fascia, which separates it from the Sciatic and Pudic vessels and from the Viscera of the Pelvis.

Branches :—Muscular,
Superior Gluteal,
Pudic,
Small Sciatic,
Great Sciatic.



Lumbar Plexus supplies: 15 muscles.

15 muscles : { 2 muscles : { Psoas Magnus.
Psoas Parvus.
Anterior Crural Nerve supplies :
7 muscles : { Iliacus,
Sartorius,
Rectus,
Vastus Externus.
“ Internus.
Crureus,
Subcrureus.

Obturator Nerve supplies :

6 muscles : { Gracilis,
Pectineus,
Obturator Externus,
3 Adductors.

Sacral Plexus supplies: 45 muscles.

5 muscles : { The external set of Os Innomin-
atum except Obturator Externus

Lumbo-Sacral or Super. Gluteal N. supplies:

3 muscles : { Tensor Vaginae Femoris,
Gluteus Medius,
“ Minimus.

Small Sciatic Nerve supplies:

1 Muscle :—Gluteus Maximus.

Great Sciatic Nerve supplies :

3 Muscles : { Biceps,
Semitendinosus,
Semimembranosus.

Popliteal Nerve supplies :

4 Muscles : { Popliteal,
Gastrocnemius,
Soleus,
Plantaris.

Posterior Tibial Nerve supplies :

3 Muscles : { Flexor Longus Pollicis,
“ “ Digitorum,
Tibialis Posticus.

Internal Plantar Nerve supplies :

5 Muscles : { Abductor Pollicis,
Flexor Brevis Digitorum,
1st and 2d Lmmbricales,
Flexor Brevis Pollicis.

45 muscles. }

External Plantar Nerve supplies :

14 Muscles : { 3d and 4th Lumbricales,
Adductor Pollicis,
Flexor Brevis Minimi Digiti,
Transversus Pedis,
7 Interossei.

Anterior Tibial Nerve supplies :

5 Muscles : { Tibialis Anticus,
Extensor Proprius Pollicis,
“ Longus Digitorum,
Peroneus Tertius,
Extensor Brevis Digitorum,

Musculo-Cutaneous Nerve supplies :

2 Muscles : { Peroneus Longus,
“ Brevis.

The Sympathetic Nervous System consists of 29 Ganglia and their connecting nerves, and is divided into :

Cephalic portion,	4	} 29 Ganglia.
Cervical	“ 3	
Dorsal	“ 12	
Lumbar	“ 4	
Sacral	“ 5	
Coccygeal	“ 1	

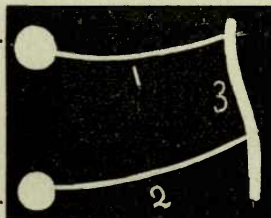
The Ganglia in the Head are :

- 1) Ophthalmic Ganglion,
- 2) Spheno-Palatine or Meckel's Ganglion,
- 3) Otic or Arnold's Ganglion,
- 4) Submaxillary “

The Greater Petrosal Nerve forms a communication between the Facial Nerve and Meckel's Ganglion, and the **Lesser Petrosal Nerve** forms a communication between the Facial Nerve and the Otic Ganglion.

Meckel's Ganglion.

Otic Ganglion.



1. Greater Petrosal Nerve.
2. Lesser “ “
3. Facial Nerve.

ORBIT.

Each Orbit is formed by 7 bones : (both by 11 bones,
that is Single bones and double the amount of Pair bones.)

Frontal,
Ethmoid,
Sphenoid,
Superior Maxillary,
Lachrymal.
Malar,
Palate.

In each Orbit are situated **7 muscles :**

6 Eye Muscles: { Superior Rectus,
External “
Inferior “
Internal “
Superior Oblique,
Inferior “ and
Levator Palpebrae.

7 Nerves supply the different organs in each Orbit:

2, 3, 4, 5, 6, 7th Cranial Nerves, and the Sympathetic
Nerves.

7 Arteries supply the same organs :

(Branches of the Ophthalmic Artery)

Lachrymal,
Nasal,
Superior Frontal,
Palpebral,
Muscular, { Superior,
Inferior.
Ciliary Arteries,
Arteria Centralis Retinae,

With each Orbit communicate 9 Foramina or Canals, which
may be arranged in the following manner:

- 4 communicating with the Cranial Cavity. { Optic Foramen,
Sphenoidal Fissure,
Anterior Fronto-Ethmoidal
Poster. " [Foramen.
- 3 communicating with the Face: { Supra-Orbital Foramen,
Infra-Orbital, "
Malar "
- 1 communicating with the Zygomatic Fossa: Spheno-
Maxillary Fissure.
- 1 communicating with Nose: Lachrymal Canal.
-

Each Nasal Cavity is formed by 9 bones, (both by 14);

Frontal,
Ethmoid,
Sphenoid,
Nasal,
Superior Maxillary,
Lachrymal,
Palate,
Inferior Turbinated,
Vomer.

and is divided into 3 Meatuses (Superior, Middle and Inferior), by the 3 Turbinated bones. The Superior and Middle Turbinated bones are portions of the Ethmoid. The Inferior Turbinated bones form bones for themselves.

The openings into each Nasal Cavity in the skeleton are 8 in number, (independent of the Anterior and Posterior Openings.)

3 entering the { Sphenoidal Cells.
Superior { Spheno-Palatine Foramen,*
Meatus: { Posterior Ethmoidal Cells.

3 entering the { Anterior Ethmoidal Cells,
Middle { Infundibulum, [more.
Meatus: { Maxillary Sinus or Antrum of High-

2 entering the { Lachrymal Canal.
Inferior Meatus: { Anterior Palatine Canal.*

* The openings marked are not present in the fresh subject.

THE EAR is divided into 3 parts : the External, Middle and Internal Ear.

The External Ear consists of
the Pinna or Auricle, and
“ Auditory Canal.

The Auricle is divided into the following parts :

Helix—the external prominent rim.
Antihelix—a second prominence in front of the Helix.
Fossa of the Helix—a depression between the Helix
and Antihelix in the upper part of the Auricle.
Concha—a deep cavity in front of the Antihelix.
Tragus—an eminence in front of the Concha,
Antitragus—an eminence opposite to the Tragus.
Lobule—the lowest part of the Auricle.

Muscles of the Ear may be divided into :

Extrinsic Muscles: { Attollens Aurem, } connecting
 { Attrahens “ } the Ear with
 { Retrahens “ } the Head.
Intrinsic Muscles: { Helicis Major and Minor,
 { Tragicus and Antitragicus,
 { Transversus Auriculæ,
 { Obliquus Auris.

Arteries of the Auricle:

Poster. Auricular, from the External Carotid.
Anter. Auricular, “ “ Temporal.
Auricular branch, “ “ Occipital.

Nerves of the Auricle :

Auricularis Magnus, from the Cervical Plexus.
Poster. Auricular, “ “ Facial.
Auricular branch “ “ Pneumogastric.
Auriculo-Temporal branch of the Infer. Maxillary.

Auditory Canal (Meatus Auditorius Externus) extends from the Concha to the Membrana Tympani. It is about $1\frac{1}{4}$ of an inch in length, and is narrowest in the middle. Its vertical section is oval, the greatest diameter being from above downwards.

The Auditory Canal may be divided into :

a cartilaginous portion about $\frac{1}{4}$ of an inch in length,
and an osseous portion “ $\frac{3}{4}$ “ “ “

ARTICLE 1. The purpose of this work is to provide a comprehensive and accurate description of the anatomy of the human body, with particular reference to the internal organs.

ARTICLE 2. The work is divided into two parts: the first part contains a general description of the human body, and the second part contains a detailed description of the internal organs.

ARTICLE 3. The work is written in a clear and concise style, and is intended for the use of students and practitioners of the medical profession. It is also intended to serve as a reference work for those who are interested in the anatomy of the human body.

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Middle ear or Tympanum is divided into :
the cavity of the Tympanum, and
the Eustachian tube.

The Tympanic cavity is situated in the Petrous portion of the Temporal bone. It is separated from the External Ear by the Membrana Tympani, and communicates with the Pharynx by the Eustachian tube. It contains 3 small bones (ossicula), viz.:

1. Malleus (hammer) attached to the Membrana Tympani.
2. Incus (anvil) situated between the Malleus and Stapes.
3. Stapes (stirrup) attached to the Fenestra Ovalis.

The Middle Ear has 10 Openings:

- | | | | |
|--------------------|---|--|--------------------|
| 5 large openings : | { | 1. Meatus Auditorius Externus, | |
| | | 2. Fenestra Ovalis leading into the Vestibule, | |
| | | 3. Fenestra Rotunda, opens into the Cochlea, | |
| | | 4. Mastoid Cells, | |
| | | 5. Eustachian Tube. | |
| 5 small openings : | { | 1. Apertura Chordae Posterior | } for the Chorda |
| | | 2. " " Anterior, | |
| | | 3. Opening for Tensor Tympani muscle, | |
| | | 4. " " Laxator " " | into |
| | | 5. Opening for Stapedius muscle. | Glaserian fissure, |

The Tympanic cavity is situated above the Jugular fosa, and between the Carotid canal anteriorly, the Mastoid cells posteriorly, the Meatus Auditorius Externus externally, and the Labyrinth posteriorly.

The Eustachian Tube is from 1½ to 2 inches in length.
It consists of

An osseous portion about ½ of an inch in length, and

A cartilaginous " " 1 inch in length.

Its direction is downwards, forwards and inwards.

The muscles of the Middle Ear are 3 in number :

Tensor Tympani (going through a bony canal above the Eustachian tube).

Laxator Tympani (going through the Glaserian fissure).

Stapedius (going from the Tympanic to the Stapes.)

Internal Ear or Labyrinth:

Consists of 3 parts: { Vestibule,
Semicircular Canals,
Cochlea.

The Vestibule is a cavity situated between the Cochlea and Semicircular canals. It has 9 openings:

In front: Apertura Scalae Vestibuli Cochleae.

Behind: The 5 openings for the 3 Semicircular Canals:

External: Fenestra Ovalis going to the Tympanum.

Internal: { Opening for the Auditory Nerve (Macula cribosa),
Aqueduct of Vestibule.

Semicircular Canals are 3 in number (1 vertical, 1 horizontal, and 1 posterior), they are situated above and behind the Vestibule, and open into the Vestibule by 5 openings (one opening being common to two of the canals).

Cochlea resembles a snail-shell. It measures about $\frac{1}{4}$ of an inch in breadth at the base, and the same in length. It consists of a canal wound spirally round a conical axis for 2 turns and a half. A thin lamina, Lamina Spiral, is situated in this canal, following its windings and divides it into 2 compartments.

The Cochlea presents 3 openings:

1. Fenestra Rotunda—opening into the Tympanum.
2. An oval opening “ “ “ Vestibule.
3. Opening of the Aqueductus Cochlea which transmits a small vein.

There are no muscles connecting with the Internal Ear.

The Arteries are the Internal Auditory from the Basilar Art.—Stylo-Mastoid—Posterior Auricular.

The Auditory Nerve divides at the bottom of the Meatus Auditorius Internus into 2 branches, the Cochlear and Vestibular.

LARYNX.

The Larynx extends from the 3d to the 5th Cervical Vertebra.

It is composed of cartilages, ligaments, muscles, blood-vessels, nerves and mucous membrane

The Cartilages are 9 in number, viz :

- 3 Single : { Cricoid,
Thyroid,
Epiglottis.
- 3 Pairs : { 2 Arytœnoid, [Laryngis,
2 Cartilages of Santorini or Cornicula
2 Cuneiform or Cartilages of Wrisberg.

The Muscles connected with the Cricoid Cartilage are 4, of these are :

- 3 Intrinsic : { Crico-Thyroid,
Crico-Arytœnoideus Lateralis,
Crico-Arytœnoideus Posticus.
- 1 Extrinsic :—Inferior Constrictor of the Pharynx.

The muscles attached to the Thyroid Cartilage are 8 in number ; of these are :

- 5 External : { Sterno-Hyoid,
Thyro-Hyoid,
Stylo-Pharyngeus,
Palato-Pharyngeus,
Superior Constrictor of the Pharynx.
- 3 Internal : { Crico-Thyroid,
Thyro-Arytœnoid,
Thyro-Epiglottideus.

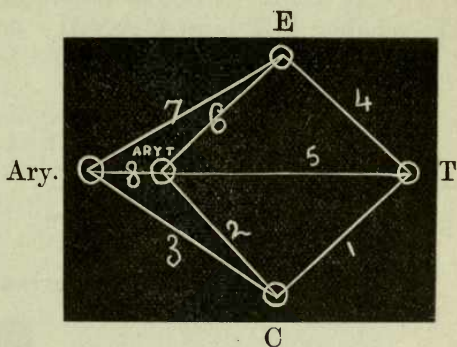
The Muscles connected with the Epiglottis are 3 pairs :

- 3 { Thyro-Epiglottideus,
Aryteno-Epiglottideus Superior,
“ “ Inferior.

One Muscle, the Arytœnoideus, connects the two Arytœnoid Cartilages.

The Muscles of the Larynx are 15 in number, 7 pairs and 1 single. These may be easily remembered in the following way :

Take the 3 points C, T, E, for the names of the 3 single cartilages—Cricoid, Thyroid and Epiglottis; mark them down in the order as they are situated in nature. Then mark 2 points for the Arytaenoid, and combine these points with lines, beginning from below upwards.



- 7 Pairs :
1. Crico-Thyroid,
 2. Crico-Arytaenoideus Lateralis,
 3. " " Posticus,
 4. Thyro-Epiglottideus,
 5. Thyro-Arytaenoideus,
 6. Arytaeno-Epiglottideus Superior,
 7. " " Inferior,

1 Single—8. Arytaenoideus.

The Larynx is supplied with blood by the Laryngeal branches of the Superior and Inferior Thyroid Arteries.

All the 15 Muscles of the Larynx, except the 2 Crico-Thyroid Muscles, are supplied by the Inferior or Recurrent Laryngeal Nerves.

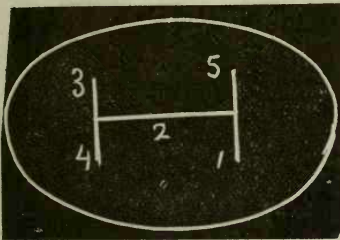
The Crico-Thyroid Muscles and the mucous membrane are supplied by the Superior Laryngeal Nerves. The Superior and Inferior or Recurrent Laryngeal Nerves are branches of the Pneumogastric Nerve.

THE LIVER.

The Liver is a glandular organ; it is situated in the Right Hypochondriac, Epigastric, and partly in the Left Hypochondriac region. It weighs from 3—4 pounds. The Liver consists of 5 lobes:

- | | | | |
|---|---|--------------------|---------|
| 5 | { | Right | } Lobe, |
| | | Left | |
| | | Lobulus Quadratus, | |
| | | “ Spigelii, | |
| | | “ Caudatus, | |

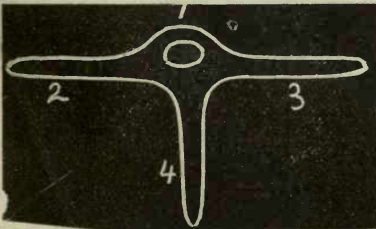
The Fissures of the Liver are 5 in number:



1. Longitudinal Fissure.
2. Transverse Fissure.
3. Fissure for the Gall Bladder.
4. “ “ Vena Cava.
5. “ “ Ductus Venosus.

The Ligaments of the Liver are 5 in number:

- | | | | | | |
|---|---|--|-------------|------------|---------------|
| 5 | { | Longitudinal or Suspensory, | } formed by | | |
| | | 2 Lateral, | | } folds of | |
| | | Coronary, | | | } Peritoneum. |
| | | Round (from obliteration of Umbilical Vein.) | | | |

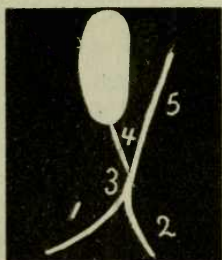


1. Coronary Ligament.
2. Right Lateral Ligament.
3. Left Lateral Ligament.
4. Suspensory Ligament.

The Vessels connecting with the Liver are 5 in number:

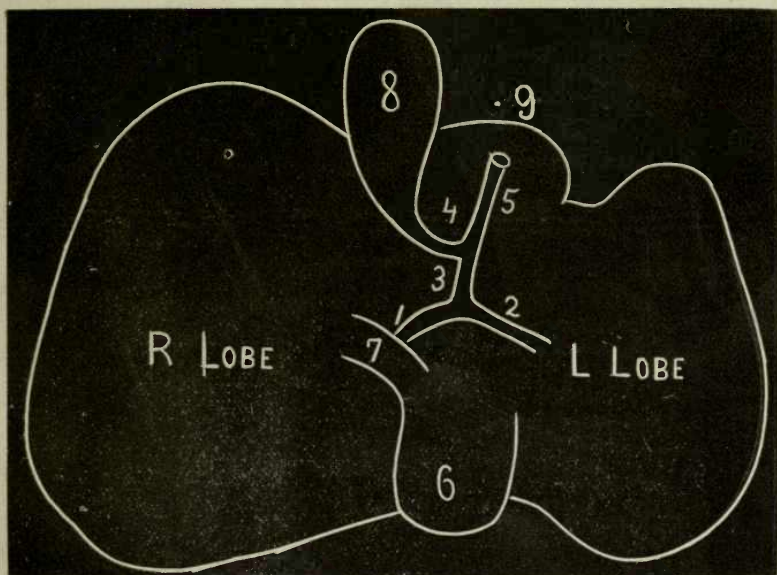
- | | | | | | | |
|---|---|---------------|--------------------------------|-------------------------------|---------------------------|-------------------------------|
| 5 | { | Portal Vein, | } These vessels are surrounded | | | |
| | | Hepatic Vein, | | } with areolar tissue, called | | |
| | | “ Artery, | | | } Capsule of Glisson, and | |
| | | “ Duct, | | | | } enter or leave the Liver at |
| | | Lymphatics. | | | | |

The Ducts connecting with the Liver and Gall Bladder are 5 in number:



1. Right Hepatic Duct.
2. Left " "
3. Common Duct,
4. Cystic Duct,
5. Ductus Communis Choledochus.

Under surface of the Liver.



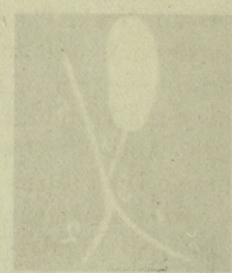
1. Right Hepatic Duct.
2. Left " "
3. Common Duct.
4. Cystic Duct.
5. Ductus Communis Choledochus.
6. Lobulus Spigelii.
7. Lobulus Caudatus.
8. Gall Bladder.
9. Lobulus Quadratus.

Glisson's Capsule contains 5 vessels:

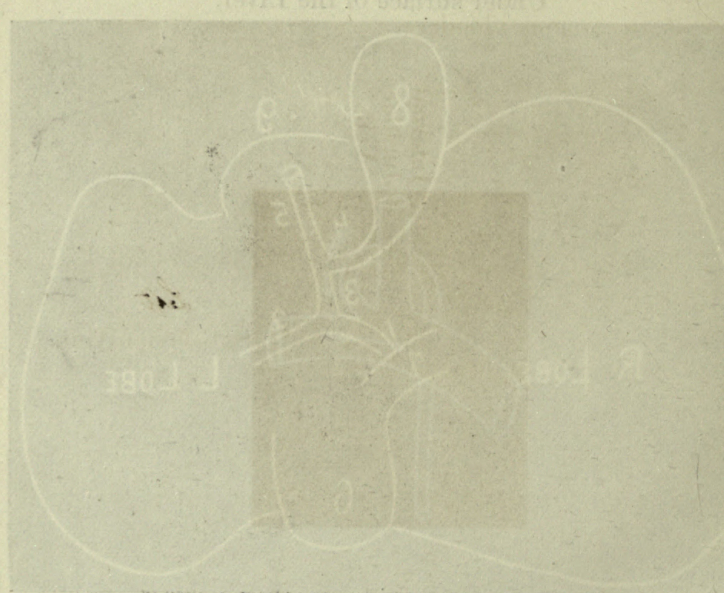
- | | | |
|---|---|---|
| 5 | { | Hepatic Artery to the Left, |
| | | Ductus Communis Choledochus to the Right, |
| | | Portal Vein posteriorly and behind, |
| | | Lymphatics, |
| | | Nerves. |

The Ducts communicate with the Liver and Gall Bladder
and the Pancreas.

1. Right Hepatic Duct
2. Left " "
3. Common Duct
4. Cystic Duct
5. Ductus Communis Cholecysticus



Interior surface of the Liver

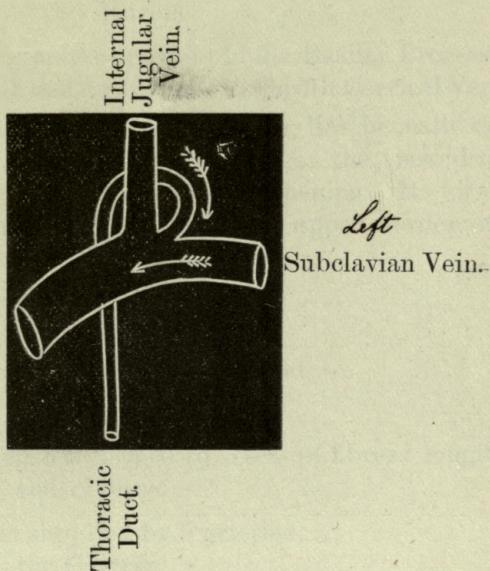


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6. Right Intra-hepatic Duct
7. Left " "
8. Common Intra-hepatic Duct
9. Cystic Duct
10. Ductus Communis Cholecysticus
11. Ductus Pancreaticus
12. Ductus Biliaris Communis

The Ductus Pancreaticus communicates with the Ductus Biliaris Communis
and the Ductus Biliaris Communis communicates with the Ductus Biliaris Communis
and the Ductus Biliaris Communis communicates with the Ductus Biliaris Communis

The Thoracic Duct is the common trunk of all the lymphatic vessels of the body excepting those of the right side of the Head, Neck, Thorax and Upper Extremity. It is about 20 inches in length and commences at the 2d Lumbar Vertebra (prolongation of the Receptaculum Chyli) ascending in front of the Vertebral Column, behind and a little to the right of the Aorta. Opposite the 4th Dorsal Vertebra the Thoracic Duct turns to the left, goes above the Subclavian Art, curves around and enters the Subclavian Vein, just where the Internal Jugular Vein terminates, in such a manner that the flow of Lymph is facilitated and not obstructed by the flow of the venous blood.



The Alimentary Canal is the canal in the body through which the food passes. It commences with the lips, and ends with the anus.

It is divided into :

- 1) Supra-Diaphragmatic Portion : { Mouth,
Pharynx
Oesophagus
- 2) Infra or Sub-Diaphragmatic Portion : { Stomach,
Small Intestine,
Large Intestine.

The Mouth has 2 openings :

the External or Anterior, and
the Posterior, leading to the Pharynx, called
Isthmus of the Fauces.

The Pharynx has 7 openings :

7 {	3 Single: {	Opening into the Mouth,
		“ “ “ Larynx,
		“ “ “ Oesophagus.
2 Pairs: {	Posterior Nares,	
	Eustachian Tubes.	

The length of the Pharynx is about 4 inches, varying in the process of swallowing. It is composed of 3 structures :

Muscular,
Aponeurotic,
Mucous.

The Pharynx reaches upwards to the Basilar Process of the Occipital, and downwards to the 5th Cervical Vertebra.

The Stomach is the shape of a bag, lies beneath the Diaphragm, and has two openings: the Oesophageal or Cardiac, and the Pyloric Opening. It forms two curvatures: the lesser on the upper border, and the greater on the lower border.

The Stomach consists of 4 coats, viz.:

a serous,	}	coat.
a muscular,		
a cellular,		
a mucous,		

The muscular coat is formed by 3 sets of fibres: longitudinal, circular, and oblique.

The Stomach is supplied by 5 arteries:

the Gastric,	}	branches of Hepatic Artery.
“ Pyloric,		
“ Right Gastro-Epiploica,		
“ Left “ “	}	branches of Splenic Artery.
Vasa Brevia,		

Small Intestine is about 20 feet in length, it is again divided into :

- 1) Duodenum,
- 2) Jejunum,
- 3) Ileum.

Duodenum is about 9 inches in length, or the breadth of 12 fingers. It is curved like a horse-shoe, and has 3 openings:

- 1) one opening into the Stomach.
- 2) “ “ “ “ Jejunum.
- 3) “ “ “ “ Ductus Communis ^hColedochus.

the Duodenum is divided into 3 portions:

- 1st or ascending portion, 2 inches in length.
- 2d or descending “ 3 “ “ “
- 3d or transverse “ 4 “ “ “

The common bile duct or Ductus Communis ^hColedochus enters the Duodenum a little below its middle.

The Jejunum does not differ in any form from the Ileum. It forms the upper 2-5, the Ilium the lower 3-5 of the length of the small intestine.

Large Intestine is about 5 feet in length. It is divided into:

- 1) Caecum,
- 2) Colon: { Ascending Colon,
Transverse “
Descending “
Sigmoid flexure.
- 3) Rectum: { Upper portion about 4 inches in length.
Middle “ “ 3 “ “
Lower “ “ 1 “ “

Caecum is a blind sac about 2½ inches in length and width. With it is connected:

the Ilio-Caecal Valve, and
Appendix Vermiformis.

It is situated in the Right Inguinal region.

N. B.—The Intestinal Canal has 4 coats:

- 1) Peritoneal or Serous,
- 2) Muscular,
- 3) Areolar or Submucous.
- 4) Mucous.

The Large Intestine can be distinguished from the small one by the following points :

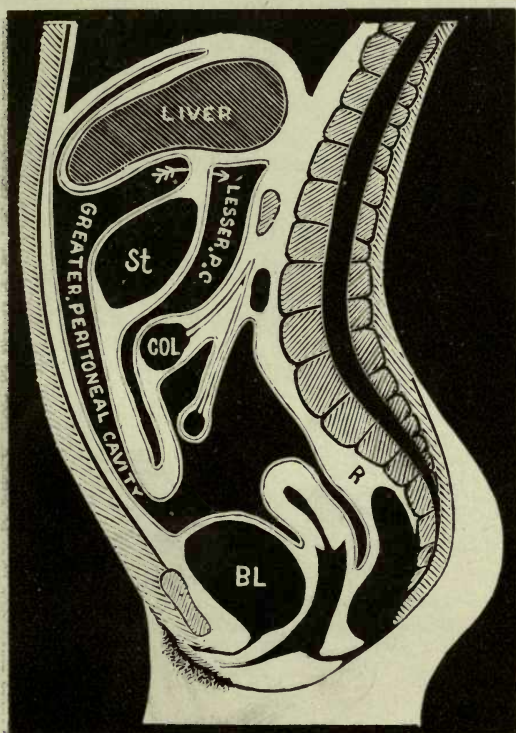
- 1) The Large Intestine is sacculated in form.
- 2) The longitudinal muscular fibres of the Large Intestine are collected into 3 bands.
- 3) The Large Intestine has fatty appendices, called : Appendices Epiploicae.

The Peritoneum is a serous membrane investing partially all the viscera in the abdomen.

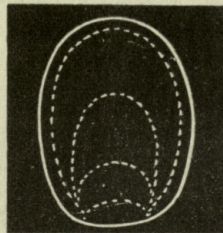
The functions of the Peritoneum are :

- 1) to give strength to the walls of the viscera.
- 2) to maintain the relation of the organs in their proper position.
- 3) to conduct vessels and nerves to the viscera.
- 4) to strengthen the walls of the abdomen.
- 5) to enable the parts to glide one on another.

Vertical Section showing the course and the 2 cavities of the Peritoneum.



The Peritoneum partially surrounds all the viscera in the abdominal cavity, and by being a shut sac (except the Peritoneum in the female, which connects with the mucous membrane of the Uterus by means of the Fallopian tubes) it must consist of 2 layers of membrane, **a visceral and a parietal layer** (a close resemblance to it forms an old fashioned night cap; or an inverted stocking or sac).



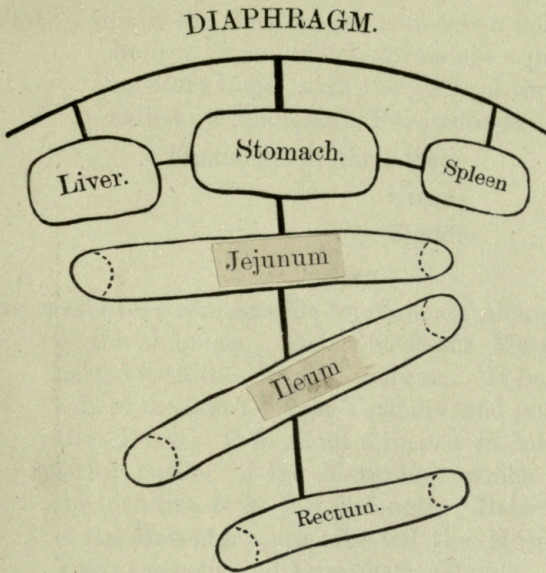
The Peritoneum forms 2 cavities, the **Greater and Lesser** each communicating with the other by the **Foramen of Winslow**.

The boundaries of this foramen are

- In front : Lesser Omentum,
- Behind : Inferior Vena Cava,
- Above : Lobulus Spigelii,
- Below : Hepatic Artery.

It forms numerous processes or folds, which have received different names, according to their situation and uses. They may be arranged under 3 heads :

- 1) Omenta or Epiploa,
- 2) Mesos,
- 3) Ligaments.



- 1) When a fold of the Peritoneum connects the stomach with any of the adjoining viscera, the connecting fold is called: an Omentum or Epiploon.

Gastro-Splenic Omentum,

“ Hepatic “

“ Colic “

- 2) When a fold of the Peritoneum connects any part of the intestinal canal except the Duodenum with the walls of the abdomen, its name is obtained by the word: “Meso” added to the particular portion of the intestine:

7	{	Mesentery		
		Meso-Caecum		
		Ascending	Meso-Colon	
		Transverse	“	“
		Descending	“	“
		Sigmoid	“	“
		Meso-Rectum		

- 3) When a fold of the Peritoneum connects a solid organ or a hollow organ, which forms not a part of the Alimentary Canal, with the walls of the abdomen it is called : a ligament. For instance :

Ligaments of the Liver,

“ “ “ Uterus,

“ “ “ Bladder.

The Mesentery connects the Jejunum and Ileum with the walls of the abdomen. The root of the Mesentery is connected with the vertebral column. It begins at the left side of the 2nd Lumbar Vertebra, and goes to the Right Iliac Fossa. It is about 6 inches in length. The anterior border of the Mesentery, which connects with the intestine is 20 feet in length. Between the 2 folds of the Mesentery are situated the Mesenteric Artery, Vein, Lacteals and Lymphatic Glands.

Ligaments formed by the folds of the Peritoneum are :

- 1) Ligaments of the Liver :

4 : { Suspensory or Falciform,
Right-Lateral,
Left- “
Coronary.

- 2) Ligament of the Spleen :

1 : Spleno-Phrenic.

- 3) Ligament of the Stomach :

1 : Gastro-Phrenic.

- 4) Ligaments of the Bladder :

5 : { Superior,
2 Lateral,
2 Posterior or Recto-Vesical.

- 5) Ligaments of the Uterus :

6 : { 2 Recto-Uterine,
2 Vesico-Uterine,
2 Lateral.

The Portions of the Alimentary Canal which are covered only partially by Peritoneum are :

- 1) Descending and transverse portion of the Duodenum.
 - 2) Caecum.
 - 3) Right or Ascending Colon.
 - 4) Left or Descending “
 - 5) Rectum.
-

Triangles of the Neck :

The lateral aspect of the Neck is quadrilateral with the following boundaries :

Above : The lower border of the Body of the Inferior Maxillary and an imaginary prolongation of this line extending from the angle of the Jaw to the Mastoid process of Temporal bone.

Below : The upper border of the Clavicle.

In Front : The median line of the Neck.

Behind : The anterior margin of the Trapezius muscle.

This quadrilateral space is subdivided by the Sterno-Cleido-Mastoid muscle into an Anterior and Posterior Triangle ; and these are again divided by the Omo-Hyoid muscle into a :

Superior Anterior Triangle,

Inferior Anterior “

Superior Posterior “

Inferior Posterior “

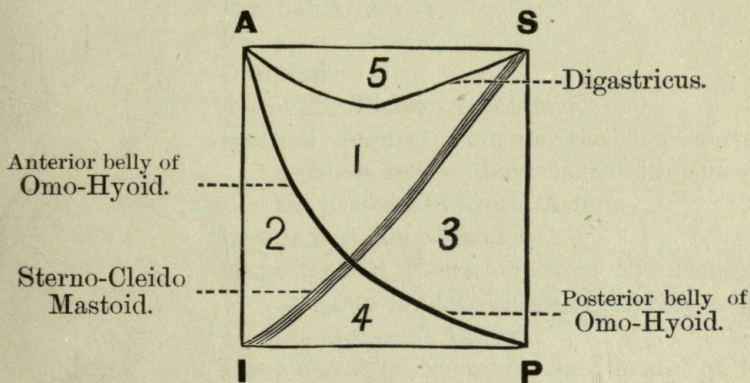
The Digastric Muscle again cuts off from the Superior Anterior Triangle the Submaxillary Triangle.

The 3 smaller triangles of the Anterior Triangle of the Neck are otherwise called :

The Submaxillary Triangle,

The Superior Carotid “

The Inferior “ “



1. Superior Anterior Triangle of Neck.
(Superior Carotid Triangle.)
2. Inferior Anterior Triangle.
(Inferior Carotid Triangle.)
3. Superior Posterior Triangle.
4. Inferior Posterior Triangle.
5. Submaxillary Triangle.

Contents of the Inferior Carotid or Inferior Anterior Triangle :

Sterno-Hyoid and Sterno-Thyroid muscles,

Trachea and Larynx.

Thyroid Gland and Inferior Thyroid Artery,

Common Carotid Artery (in a sheath with the

Internal Jugular Vein and Pneumogastric Nerve

See page No. 298).

In front of the sheath are

Descendens Noni and

Communicans Noni Nerves.

Behind: Recurrent Laryngeal Nerve.

N. B.—The Common Carotid Artery may be tied in this triangle.

Contents of the Superior Carotid Triangle :

Upper part of the Common Carotid Artery.
Lower parts of the External and Internal
Carotid arteries (the External being more
anterior than the Internal).
Superior Thyroid Artery,
Lingual Artery,
Facial “
Occipital “
Ascending Pharyngeal Artery.
Internal Jugular Vein and the veins corres-
ponding to the above named branches of
the External Carotid Artery.
Descendens Noni Nerve.
Hypo-Glossal Nerve, crossing the External
and Internal Carotids and curving round
the Occipital Artery.
Pneumogastric Nerve in the sheath of the
Common Carotid Artery and Internal
Jugular Vein.
Sympathetic Nerve on the outer side of the
triangle.
Spinal Accessory Nerve, before it penetrates
the Sterno-Cleido-Mastoid Muscle.
Superior Laryngeal Nerve on the inner side of
the triangle below the Hyoid bone.
The Upper part of the Larynx and
Lower part of the Pharynx.
Thyro-Hyoid Muscle,
Hyo-Glossus “
Inferior and Middle Constrictor of the Pharynx

Contents of the Submaxillary Triangle :

Submaxillary Gland.
Facial Artery and Vein.
Mylo-Hyoid Muscle.
Hyo-Glossus “
Submental Artery.
Mylo-Hyoid Artery and Nerve.
Stylo-Maxillary Ligament.

Upper part of the Common Carotid Artery
 Lower part of the External and Internal
 Carotid arteries (the External being more
 inferior than the Internal)
 Superior Thyroid Artery
 Internal Artery
 Facial Artery
 Oculi Artery
 Ascending Pharyngeal Artery
 Internal Jugular Vein and the veins com-
 mencing in the above named branches of
 the External Carotid Artery
 Descending Nerve
 Hypo-pharyngeal Nerve crossing the External
 and descending Trachea and entering vocal
 cords
 the superficial Artery
 Pharyngeal Nerve in the sheath of the
 Common Carotid Artery and Internal
 Jugular Vein
 Sympathetic Nerve on the outer side of the
 triangle
 External Jugular Vein below it passing
 the Sternocleidomastoid Muscle
 Transverse Cervical Nerve on the inner side
 the triangle below the Thyroid Vein
 The lower part of the External and
 Internal Carotid Artery
 Lower part of the Pharynx
 Thyroid Gland
 Hyoid Bone
 Inferior and Middle Constrictor of the Pharynx

Submandibular Gland
 Facial Artery and Vein
 Mylo-hyoid Muscle
 Hyo-glossus
 Submental Artery
 Mylo-hyoid Artery and Vein
 Stylo-hyoid Ligament

External Carotid Artery,
Internal “ “
Facial Nerve.
Posterior Auricular Artery.
Temporal “
Internal Maxillary “
Internal Jugular Vein.
Pneumogastric Nerve.
Stylo-Glossus Muscle.
Stylo-Pharyngeus “
Glosso-Pharyngeal Nerve.

Contents of the Inferior Posterior Triangle or Subclavian Triangle :

The 3d portion of the Subclavian Artery.
Brachial Plexus of Nerves.
Suprascapular Artery and Vein.
Transversalis Colli.
External Jugular Vein.
Scalenus Anticus Muscle.
Subclavian Vein
Phrenic Nerve.
Lymphatic Glands.
Right resp. Left Lymphatic or Thoracic Duct.

Contents of the Superior Posterior or Occipital Triangle.

Ascending branches of the Cervical Plexus.
Descending branches of the Cervical Plexus.
Spinal Accessory Nerve.
Transversalis Colli Artery and Vein.
Lymphatic Glands.
Splenius Capitis and Colli.
Levator Anguli Scapulae.
Scalenus Medius.
Scalenus Posticus.

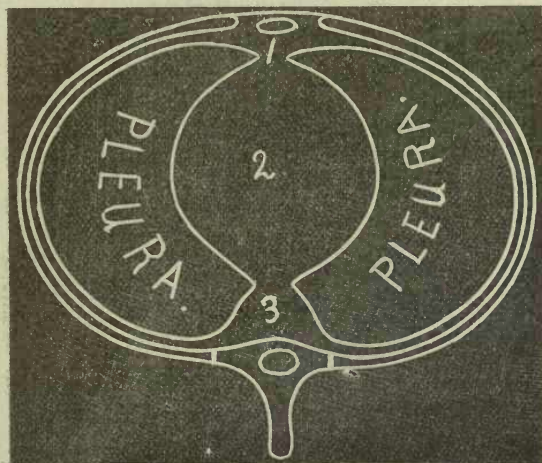
Internal Jugular Vein
Internal Carotid Artery
Subclavian Artery
Subclavian Vein
Thoracic Duct
Lymphatic System
Ventricles of the Heart
Aorta
Pulmonary Artery
Pulmonary Vein
Superior Vena Cava
Inferior Vena Cava
Uterine Artery
Uterine Vein
Ovarian Artery
Ovarian Vein
Renal Artery
Renal Vein
Hepatic Artery
Hepatic Vein
Splenic Artery
Splenic Vein
Gastric Artery
Gastric Vein
Pancreatic Artery
Pancreatic Vein
Mesenteric Artery
Mesenteric Vein
Celiac Artery
Celiac Vein
Superior Mesenteric Artery
Superior Mesenteric Vein
Inferior Mesenteric Artery
Inferior Mesenteric Vein
Renal Artery
Renal Vein
Hepatic Artery
Hepatic Vein
Splenic Artery
Splenic Vein
Gastric Artery
Gastric Vein
Pancreatic Artery
Pancreatic Vein
Mesenteric Artery
Mesenteric Vein
Celiac Artery
Celiac Vein
Superior Mesenteric Artery
Superior Mesenteric Vein
Inferior Mesenteric Artery
Inferior Mesenteric Vein

Diagram of the Superior Mesenteric Artery and Vein

The Superior Mesenteric Artery and Vein are the main blood supply to the abdominal organs. The Superior Mesenteric Artery arises from the abdominal aorta and divides into the celiac, superior mesenteric, and inferior mesenteric arteries. The Superior Mesenteric Vein drains the blood from the abdominal organs and joins the inferior vena cava. The diagram shows the course of these vessels and the organs they supply. The celiac artery supplies the stomach, spleen, and pancreas. The superior mesenteric artery supplies the small intestine, cecum, and ascending colon. The inferior mesenteric artery supplies the descending colon, sigmoid colon, and rectum. The Superior Mesenteric Vein drains the blood from the small intestine, cecum, and ascending colon. The inferior mesenteric vein drains the blood from the descending colon, sigmoid colon, and rectum. The diagram also shows the relationship between the arteries and veins and the organs they supply.

Mediastinum.

The Mediastinum is the place left in the median line of the Thorax by the non-approximation of the 2 Pleurae. It is divided into an anterior, middle and posterior portion.



1. Anterior Mediastinum.
2. Middle “
3. Posterior “

The Anterior Mediastinum :

Boundaries : In front : Sternum

Laterally : Right and Left Pleura.

Behind : Pericardium.

Contents :

Sterno-Hyoid Muscle.

Sterno-Thyroid Muscle.

Triangularis Sterni Muscle.

Internal Mammary Vessels (on the left side.)

Remains of Thymus Gland.

Lymphatics.

Middle Mediastinum :

Boundaries : In front Pericardium.

Laterally : Right and Left Pleura.

Behind : Pericardium.

Contents :

Heart (inclosed in the Pericardium).

Ascending Aorta.

Superior Vena Cava.

Bifurcation of the Trachea.

Pulmonary Arteries and Veins.

Phrenic Nerves.

Posterior Mediastinum :

Boundaries : In front Pericardium and Roots of the Lungs.

Laterally : Right and Left Pleura.

Behind : Vertebral Column.

Contents :

Descending Aorta.

Greater and Lesser Azygos Veins.

Left Superior Intercostal Vein.

Pneumogastric and Splanchnic Nerve.

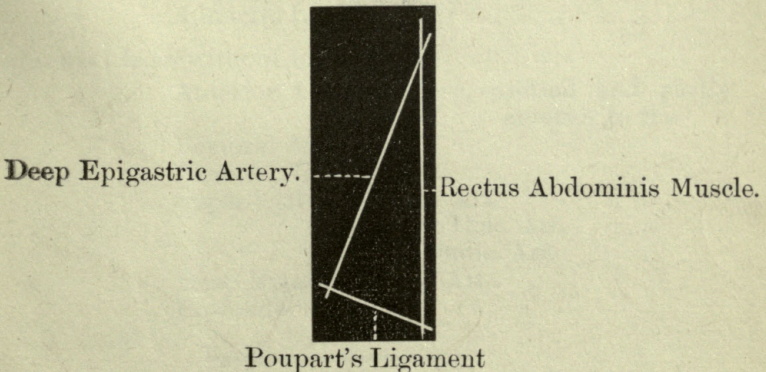
Oesophagus.

Thoracic Duct.

Lymphatic Glands.

Hesselbach's Triangle.

Hesselbach's Triangle is a triangular space at the lower portion of the anterior abdominal wall.

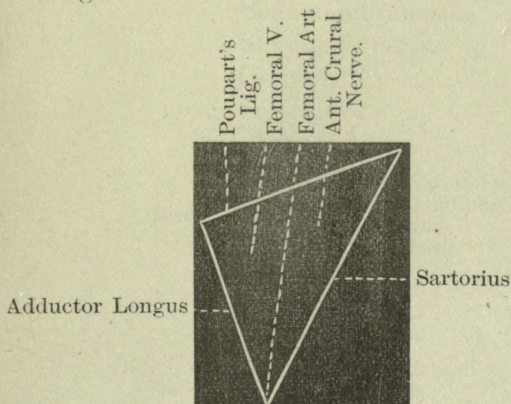


Boundaries: Externally : Deep Epigastric Artery.
Internally : External border of the Rectus Abdominis Muscle.
Below : Poupart's Ligament.

N. B.—In Direct Inguinal Hernia the protrusion appears in this triangle.

Scarpa's Triangle

Is a triangular space in the upper and inner portion of the Thigh.



Boundaries : Externally : Inner border of Sartorius Muscle
Internally : Outer border of Adductor Longus Muscle.

Above : Poupart's Ligament.

The floor of this space is formed by, from without inwards :
Iliacus Muscle,
Psoas Magnus Muscle.
Pectineus “
Adductor Longus “

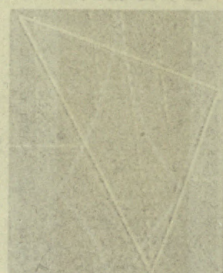
Contents : from without inwards :

Anterior Crural Nerve, external and partly anterior to the
Femoral Artery.
Femoral Vein.
Superficial Epigastric Art.
“ Circumflex Iliac Art.
“ External Pudic Art.
Deep External Pudic Art.
Profunda Art.

Adductor longus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor brevis: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor magnus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor minimus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor parvus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor minimus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Scarpa's Triangle

Scarpa's Triangle is a triangular space in the upper and inner portion of the thigh.



Adductor longus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor brevis: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.
 Adductor magnus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Adductor minimus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Adductor parvus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Adductor minimus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Adductor parvus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Adductor minimus: Extends from the lesser trochanter of the femur to the lesser trochanter of the femur.

Popliteal Space

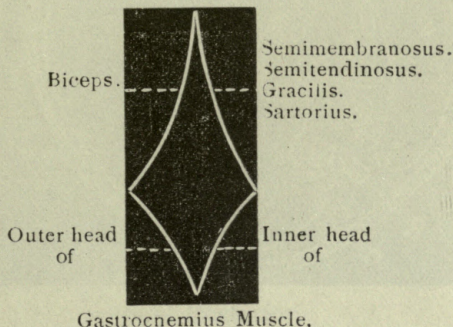
is a quadrilateral space on the posterior surface of the Knee, occupying the lower 3d of the Thigh and the upper 5th of the Leg.

Boundaries : Externally above the joint :

Biceps Muscle.

Internally above the joint :

Semimembranosus,
Semitendinosus,
Gracilis,
Sartorius.



Externally below the joint :

External head of Gastrocnemius,
Plantaris.

Internally below the joint :

Inner head of Gastrocnemius.

The floor of this space is formed by :

Popliteal space of the Femur,
Poster. Ligament of the Knee joint,
Popliteus Muscle.

Contents : from the integument to the bone :

Internal Popliteal Nerve.

External Popliteal Nerve on the outer side of
the space near the Biceps.

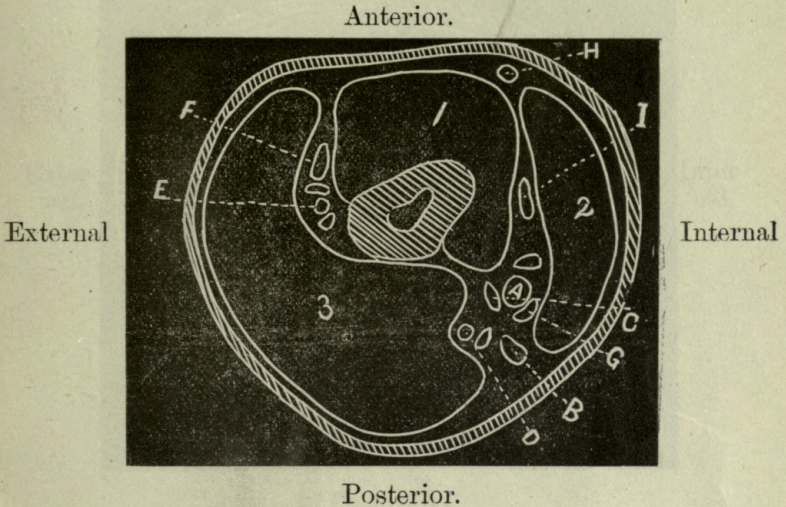
Popliteal Vein,

Popliteal Artery and branches (nearest to the
bone) surrounded by Lymphatic Glands.

SECTIONS.

The careful study of the following sections will prove very beneficial as a recapitulation to the advanced student.

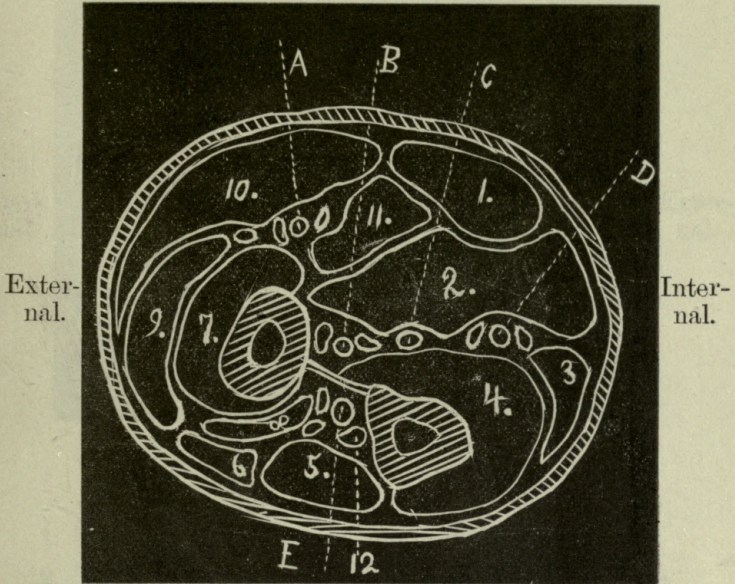
SECTION THROUGH THE RIGHT ARM.



1. Brachialis Anticus.
2. Biceps Flexor Cubiti.
3. Triceps Extensor Cubiti.
- A. Brachial Artery and Vein.
- B. Basilic Vein with Internal Cutaneous Nerve.
- C. Ulnar Nerve.
- D. Inferior Profunda Vessels.
- E. Superior “ “
- F. Musculo Spiral Nerve.
- G. Median Nerve.
- H. Cephalic Vein.
- I. Musculo Cutaneous Nerve.

SECTION THROUGH THE RIGHT FORE-ARM.

Anterior.

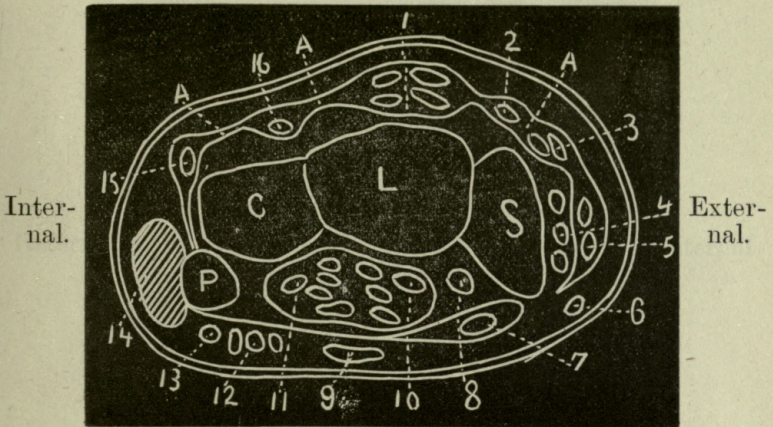


Posterior.

1. Flexor Carpi Radialis.
2. " Sublimis Digitorum.
3. " Carpi Ulnaris.
4. " Profundus Digitorum.
5. Extensor Carpi Ulnaris.
6. " Communis Digitorum.
7. " Ossis Metacarpi Pollicis.
8. Supinator Brevis.
9. Flexor Carpi Ulnaris.
10. Supinator Longus.
11. Pronator Teres.
12. Extensor Secundi Internodii.
- A. Radial Vessels and Nerve.
- B. Anterior Interosseous Vessels and Nerve.
- C. Median Nerve.
- D. Ulnar Vessels and Nerve.
- E. Posterior Interosseous Vessels and Nerve.

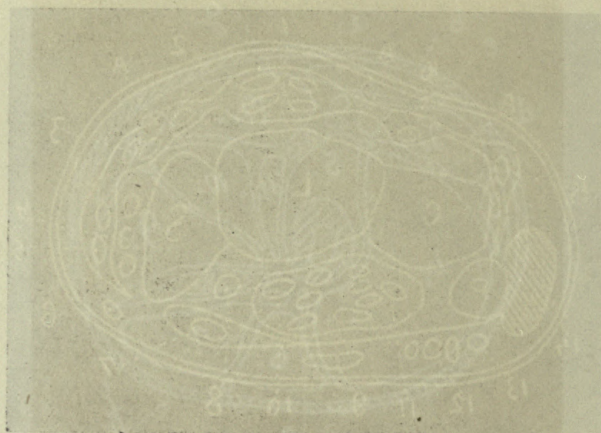
SECTION THROUGH THE RIGHT WRIST.

Posterior.



Anterior.

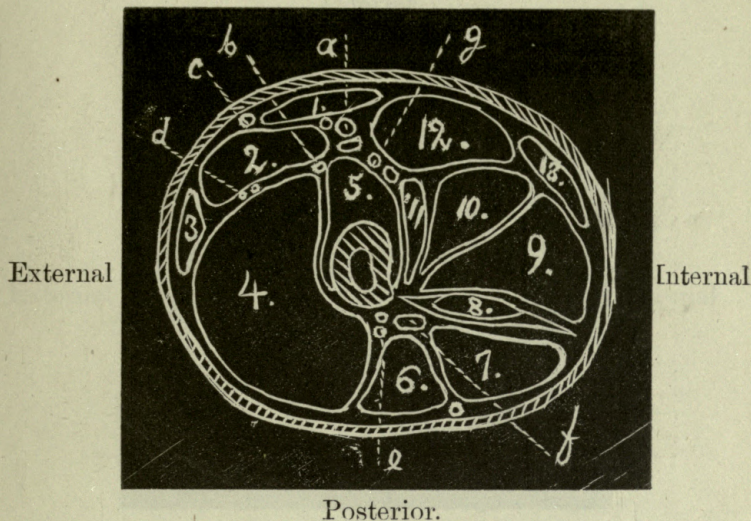
1. Tendons of Extensor Communis Digitorum.
2. Tendons of Extensor Secundi Internodii Pollicis.
3. Tendons of Extensor Carpi Radialis Longior and Brevior.
4. Radial Vessels.
5. Tendons of Extensor Ossis Metacarpi and Primi Internodii Pollicis.
6. Radial Nerve.
7. Tendon of Flexor Carpi Radialis.
8. Tendon of Flexor Longus Pollicis.
9. Tendon of Palmaris Longus.
10. Median Nerve.
11. Tendons of Flexor Sublimis and Profundus Digitorum.
12. Ulnar Vessels.
13. Ulnar Nerve.
14. Abductor Minimi Digiti.
15. Extensor Carpi Ulnaris.
16. Extensor Minimi Digiti.
- A. A. A. Annular Ligament.



1. Tendon of Extensor Carpi Radialis Proximus
2. Tendon of Extensor Carpi Radialis Distalis
3. Tendon of Extensor Carpi Ulnaris
4. Tendon of Extensor Digitorum
5. Tendon of Extensor Indicis
6. Radial Nerve
7. Tendon of Flexor Carpi Radialis
8. Tendon of Flexor Carpi Ulnaris
9. Tendon of Palmaris Longus
10. Median Nerve
11. Tendon of Flexor Sublimis and Flexor Digitorum
12. Ulnar Vessel
13. Ulnar Nerve
14. Adductor Muscular Branch

SECTION OF THE RIGHT THIGH.

Anterior.



At upper portion of Scarpa's Triangle.

1. Sartorius Muscle.
2. Rectus Femoris.
3. Tensor Vaginae Femoris.
4. Vastus Externus.
5. Vastus Internus and Crureus.
6. Biceps Flexor Cruris.
7. Semitendinosus.
8. Semimembranosus.
9. Adductor Magnus.
10. Adductor Brevis.
11. Pectineus.
12. Adductor Longus.
13. Gracilis.
- a. Femoral Artery and Vein.
- b. Anterior Crural Nerve.
- c. External Cutaneous Nerve.
- d. External Circumflex Vessels.
- e. Small Sciatic Nerve.
- f. Great Sciatic Nerve.
- g. Profunda Vessels.

Anterior



Posterior

11 upper portion of superior vena cava

12 inferior vena cava

13 pulmonary trunk

14 pulmonary artery

15 tensor fasciae latae

16 tensor fasciae latae

17 tensor fasciae latae

18 tensor fasciae latae

19 tensor fasciae latae

20 tensor fasciae latae

21 tensor fasciae latae

22 tensor fasciae latae

23 tensor fasciae latae

24 tensor fasciae latae

25 tensor fasciae latae

26 tensor fasciae latae

27 tensor fasciae latae

28 tensor fasciae latae

29 tensor fasciae latae

30 tensor fasciae latae

31 tensor fasciae latae

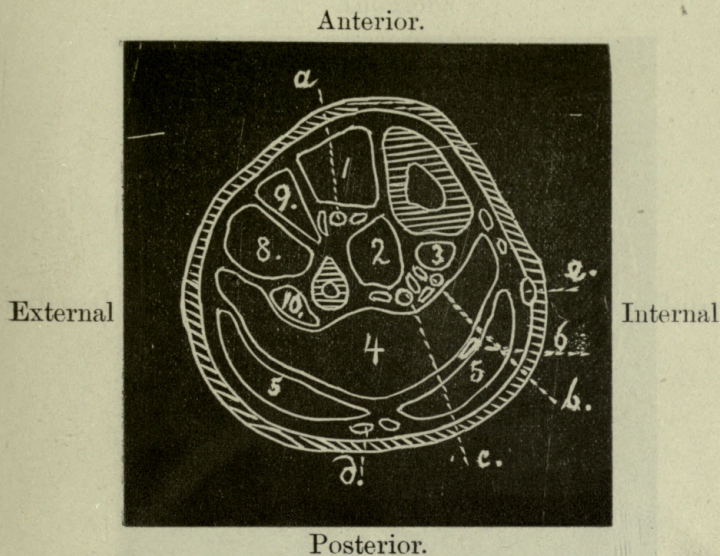
32 tensor fasciae latae

33 tensor fasciae latae

34 tensor fasciae latae

35 tensor fasciae latae

SECTION THROUGH THE RIGHT LEG, UPPER THIRD.



1. Tibialis Anticus.
2. Tibialis Posticus.
3. Flexor Longus Digitorum.
4. Soleus.
5. Gastrocnemius.
6. Tendon of Plantaris.
8. Peroneus Longus.
9. Extensor Longus Digitorum.
10. Flexor Longus Pollicis.
- a. Anterior Tibial Vessels.
- b. Posterior Tibial Vessels.
- c. Peroneal Vessels.
- d. External Saphenous Vein and Nerve.
- e. Internal Saphenous Vein.

OF THE HUMAN BODY, WITH THE VARIOUS PARTS OF THE ANATOMY.

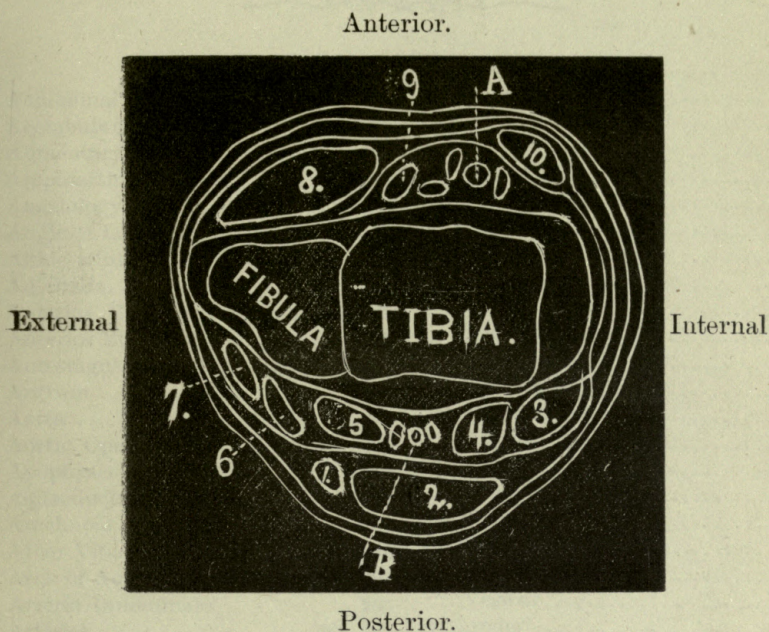
PLATE I.



Fig. 1.

1. Tibialis Anterior
2. Tibialis Posterior
3. Flexor Digitorum
4. Soleus
5. Gastrocnemius
6. Tendon of Plantaris
7. Peroneus Longus
8. Extensor Digitorum
9. Extensor Indicis
10. Flexor Digitorum
- a. Anterior Tibial Vessel
- b. Posterior Tibial Vessel
- c. Peroneal Vessel
- d. External Saphenous Vein and Nerve
- e. Internal Saphenous Vein

SECTION THROUGH THE RIGHT ANKLE.



1. Plantaris.
 2. Tendo Achillis.
 3. Tibialis Posticus.
 4. Flexor Longus Digitorum.
 5. Flexor Longus Pollicis.
 6. Peroneus Brevis.
 7. Peroneus Longus.
 8. Extensor Longus Digitorum and
Peroneus Tertius.
 9. Extensor Proprius Pollicis.
 10. Tibialis Anticus.
- A. Anterior Tibial Vessels and Nerve.
- B. Posterior Tibial Vessels and Nerve.

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POSTSCRIPTUM.

The delay of several months in the publishing of this book, was caused by an injunction placed upon it by Messrs. G. H. Putnam & Son, and A. Ranney, M. D., publishers and one of the authors of "The Essentials of Anatomy," claiming that I made use of Professor Darling's tables and tabulated statements, without their permission, which belonged to them.

I feel it a duty in behalf of my many friends and subscribers to this book, as well as in behalf of the many students who have been, and are now studying for a number of years with me, to copy here the following statements from the proceeding at law, which will clearly show that not Messrs. Putnams and A. Ranney, M. D., are the aggrieved, but rather I myself.

I. Affidavit of W. DARLING, M. D., F. R. C. S., Professor of Anatomy, University of New York, Medical Department.

N. Y. SUPREME COURT,

City and County of New York, ss.:

William Darling, being duly sworn, says, that he knows A. L. Ranney, and has read the affidavit of said Ranney in this action. **That he has never authorized any person to make him a party to any suit or proceeding against Dr. Meyer or any other person.** That he has this day read for the first time the contract purporting to have been made by this deponent and said Ranney, and said G. P. Putnam & Son. Deponent admits that he signed a contract presented to him by said Ranney, who stated to deponent that it was the usual contract made for or with the publishers of such works as proposed to be published by said G. P. Putnam & Sons. That he never delivered any manuscript in connection with said Ranney to the said Putnam & Sons.

That this deponent told the defendant Meyer that he had no objection to his printing the tables and lectures of deponent, and delivered by this deponent in and during his lectures to the students of the University of the City of New York, in which this deponent is a professor,

That the lectures and tabulated statements used by Dr. Meyer were used before the said Ranney delivered any lectures in the said University, and **that the book of said Meyer was lithographed and sold by said Meyer before the date at which the said Ranney delivered any lecture to or before the students of the University aforesaid, and before the date of the contract aforesaid.** Deponent further says that the lectures and tabulated forms used by deponent in his lectures have been printed and circulated among the students and others to the number of thousands, and that said tabulated statements are hereto annexed marked "A."

That deponent does not believe that said Meyer's book is calculated to injure the sale of the proposed book, but will rather create a desire for them, provided they are as represented by said Meyer. That the said Meyer is a most ingenious and valuable man in getting up tables and drawings to aid the students in acquiring a knowledge of the science of Anatomy, and as aid to

deponent in explaining his views in his lectures, that the designs, tables or drawings are original and most useful, and **that said drawings or tables were designed by said Meyer long before the contract mentioned in the above entitled action was made or entered into.**

Deponent further says that the said Meyer's assistance to this deponent has been of great value, **and his work and drawings are most meritorious in every respect and simplifies the teaching of the science of Anatomy,** and that deponent is indebted to said Meyer for many valuable suggestions and original ideas, and that deponent considers the said Meyer an admirable Anatomical Artist.

Deponent further says that he has read the affidavit of George Haven Putnam, and deponent denies that he ever authorized the said Putnam to act in any respect as his agent.

Sworn to before me }
this 2d day of March, 1880. }

WILLIAM DARLING.

LOUIS F. MURRAY,

Notary Public, (182)

N. Y. City and County.

II.—Decision rendered by Justice Donohue, at Special Term of the Supreme Court, before whom the case was tried, is as follows, to wit:—

While the papers are voluminous, the material matters are in a small compass. Darling, one of the plaintiffs, delivered certain lectures which he consented to defendant's publishing. Most of the matter in the publication objected has been published and copyrighted in England. Darling also agreed to let the plaintiffs publish it. **He now expressly disclaims all objection to Meyer's publishing, and asks to be considered as standing mutual between the parties.** The agreement under which the Messrs. Putnam claim provides for the delivery of a manuscript of Ranney and Darling and gave them the exclusive right to publish it, and they have published it, and more, is public property, to be protected by such laws as protect published works, which the court cannot do; **but I do not understand why the defendants are charged with the publication of this work, but of lectures and tables delivered in New York or copyrighted in England and published. There is nothing to show that the lectures were not delivered publicly by Darling and the subject matter either taken down by the defendant or remembered by him. There is nothing fairly showing that he has surreptitiously obtained the matter without the consent of the lecturer. The facts show that he had the authority of the lecturer for the publication of the lectures, and the lecturer now publicly states in Court he has no objection to that publication. Under these circumstances I do not think there is any authority to grant the injunction asked for.**

III. My Counsel in his brief made and argued the following points :

I.—The only remedy the plaintiffs could have invoked was an action in the Federal Courts, based upon the theory that their work was copyrighted. Their book was never copyrighted; they do not allege that it was; and even in a Federal Court they would have no *status*.

II.—The Court will not decide the merits of this case on affidavits; neither will it interfere by injunction, where even a conflict exists in the evidence.

III.—It is uncontradicted proof that the book, the publication of which is sought to be enjoined by the plaintiffs, is *simply a second edition* of a work published by the defendant Meyer, long before the commencement of these proceedings.

IV.—The book sought to be published by the plaintiffs is undoubtedly an imitation in most essential particulars of the book long since published by Dr. Meyer. The plaintiff, Ranney, admits that some portions of his work were received from Dr. Meyer, but claims that he had Dr. Meyer's permission to publish them. *This Dr. Meyer denies.*

An examination of the work of the plaintiff, Ranney, and that of the defendant, Meyer, justifies the conclusion that it is the latter and not the former who has been aggrieved.

V.—Professor Darling, one of the parties to this suit, states in open Court that he has no objection to make to the publication of Dr. Meyer's work, and that he has never had any.

VI.—Professor Darling was originally made one of the plaintiffs in this action, but when it was found that the cause did not meet with his approbation, he was made a party defendant, and it is sought to attack him through the affidavits of Mr. Solomon and one Gullivar. The aspersions and mis-statements of these two individuals were fully met and refuted by the learned professor in open Court on his own behalf.

VII.—This case is now on the Special Term calendar of this Court marked ready for trial. It was placed thereon by the respondent, Meyer. It will in all human probability be reached and tried this term and the various issues disposed of.

VIII.—It is submitted that the proof fully justifies the opinion of the learned Justice below, wherein he says, among other things: "That there is nothing shown that the lectures were not delivered publicly by Professor Darling, and the subject matter either taken down by the defendant Meyer or remembered by him. There is nothing fairly showing that he has surreptitiously obtained the matter without the consent of the lecturer."

CURTIS & NEVILLE,

Attys. for Deft. MEYER.

NEW YORK.

LEO. TH. MEYER, M. D.,

347 Second Avenue.

"**The Anatomical Catechism,**" or the whole Human Anatomy in questions and answers, and "**The History of the Science of Medicine,**" in different ages and countries, arranged in tables with brief notes, by LEO TH. MEYER, M. D., will be published shortly.

